SOUTHERN October, 1943 25 Cents

Flight

CIVIL AIR PATROL EDITION

Per

TIME TABLE BOMBING

With reliable Hydromatics out in front, mighty Liberators and Flying Fortresses are relentlessly pursuing their planned course on schedule — operating their deadly shuttle service across Europe.

HAMILTON STANDARD PROPELLERS

EAST HARTFORD, CONNECTICUT

ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

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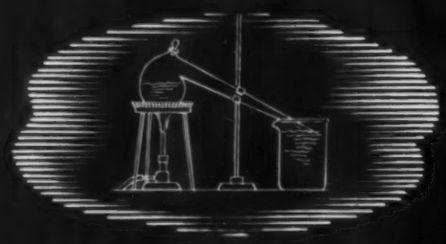

Lessons From The War

From our wartime experience we can say this: When peace comes, Americans will enjoy the comfort and convenience of many strange new devices which are today devoted to military purposes. They will not only extend our span of life but also make it pleasanter in many ways. The 4-plant facilities of The Weatherhead Company are prepared to help you build these peacetime products just as we've helped build America's cars, planes and refrigerators in the past. We offer you better designing than ever, much lowered production costs and a highly efficient service organization.

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO
Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

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Out of Great Emergencies . . . New Leaders Arise

AMONG FREE MEN, always, new leaders arise to meet the challenge of great emergencies. These are the men who deny the "don'ts" and the "can'ts" of conservative years . . . who dare the impossible.

There were several such "impossibilities" in the aluminum industry, before Pearl Harbor. It was "impossible" that America's war needs could ever exceed what was then considered a huge national production capacity . . . or that imports of foreign bauxite could be stopped . . . or that our bauxite could be turned into purest aluminum.

But far back in 1940, a single company challenged all three of those "impossibilities." Reynolds, then the world's largest aluminum foil producer, built a huge new plant in Alabama . . . began mining domestic ore . . . and deliberately prepared to process low-grade bauxite. Today, this is the only plant in the U. S. where bauxite comes in at one end, *and aluminum sheet rolls out the other!*

As war came, the huge rewards of this pioneering became apparent even to the most skeptical. But Reynolds kept on breaking precedents. From earth to aluminum sheet was one step. They dared the next step . . . earth to sheet *to finished aircraft parts.* Now Reynolds feeds endless streams of airplane parts to assembly lines throughout America!

And there is even more to this story than the quantity production of aluminum ingot, aluminum sheet and finished aircraft parts. The wings of our victorious airmadas demand quality as well as quantity . . . they must be made ever lighter and stronger. Reynolds engineers are preparing to announce new miracles of metallurgy. Further "impossibilities" will be conquered . . . in Reynolds' steady progress toward Leadership in Aluminum.

REYNOLDS ALUMINUM

OUT OF THE GROUND INTO THE SKY

REYNOLDS METALS COMPANY
GENERAL OFFICES, RICHMOND, VA.
38 PLANTS IN 13 STATES

AMERICA'S NEW SOURCE OF ALUMINUM

TOMORROW THEY WILL FLY!

Family flying must be *safe* flying and *safe* flying must be *fire-safe*. That's why the Guiberson air-cooled radial diesel engine, using fuel that will not burn even when exposed to flame, is the power plant for the family plane of tomorrow. Guiberson powered equipment is now hitting the Axis in distant corners of the world. It is ready today to serve American industry with fire-safe power on land, on sea and in the air!

Guiberson U.S.A.
THE GUIBERSON DIESEL ENGINE COMPANY
THE GUIBERSON CORPORATION
Aircraft and Heater Division
DALLAS, TEXAS CHICAGO, ILLINOIS

Southern Flight

Tenth Year of Publication
and Faithful Service to the American Aviation Industry

OCTOBER, 1943 VOL. XX, NO. 4

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BUSINESS STAFF: R. T. Gidley, Jodie Ligon, Fred G. Wiggins, Conard Baker, Jr. (In U. S. service with Seabees).
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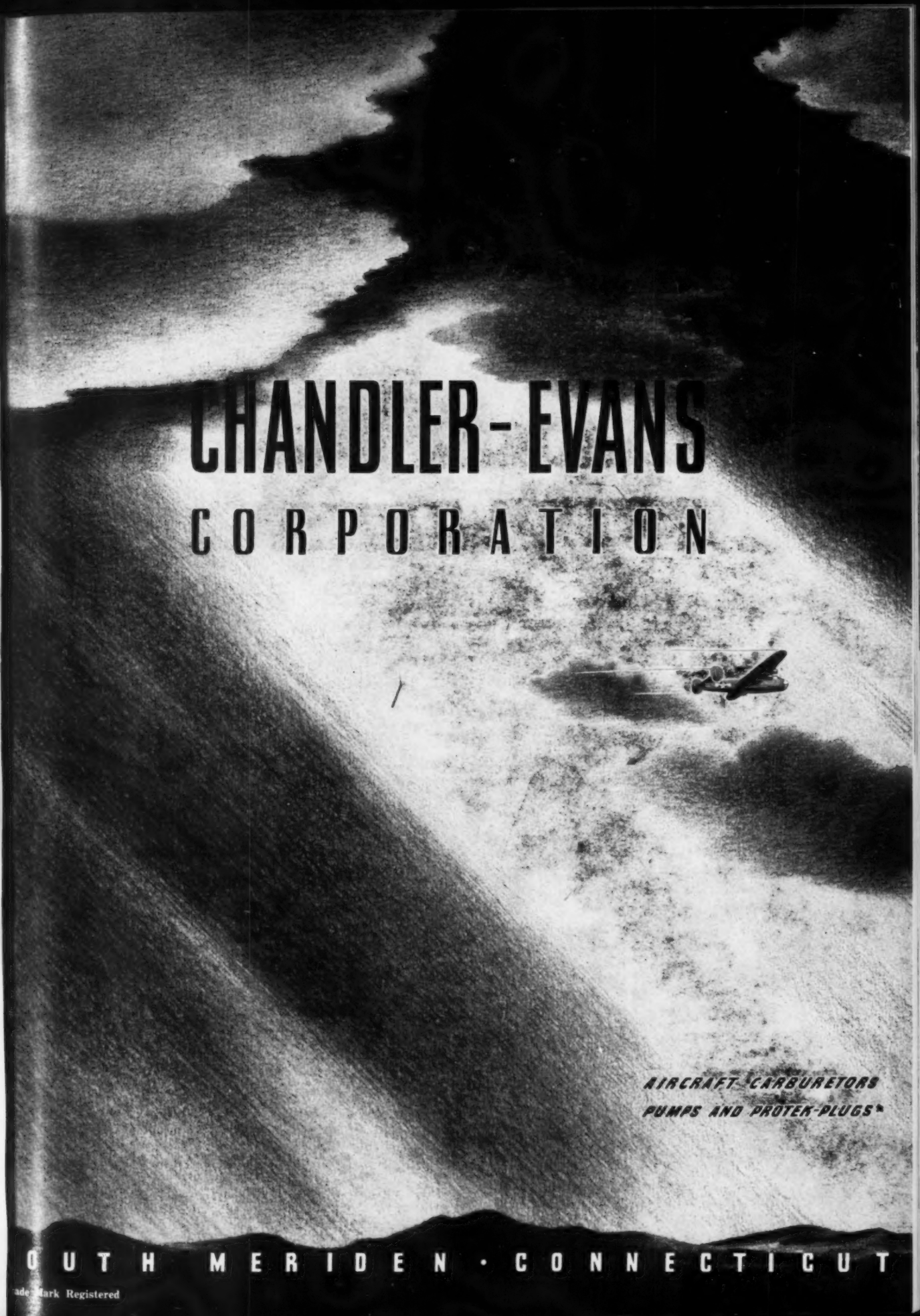
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BACKGROUND FOR PRECISION

In seeking to conquer infinite space, the aircraft engine builder must master the infinitesimal.

He must achieve exquisite precision in the motor he makes.

Such precision has been a habit with Allison for many years. It has been our assignment to handle production problems requiring special skills.

For here is wide experience in fine design.

Here is deep understanding of the strength and structure of metals.

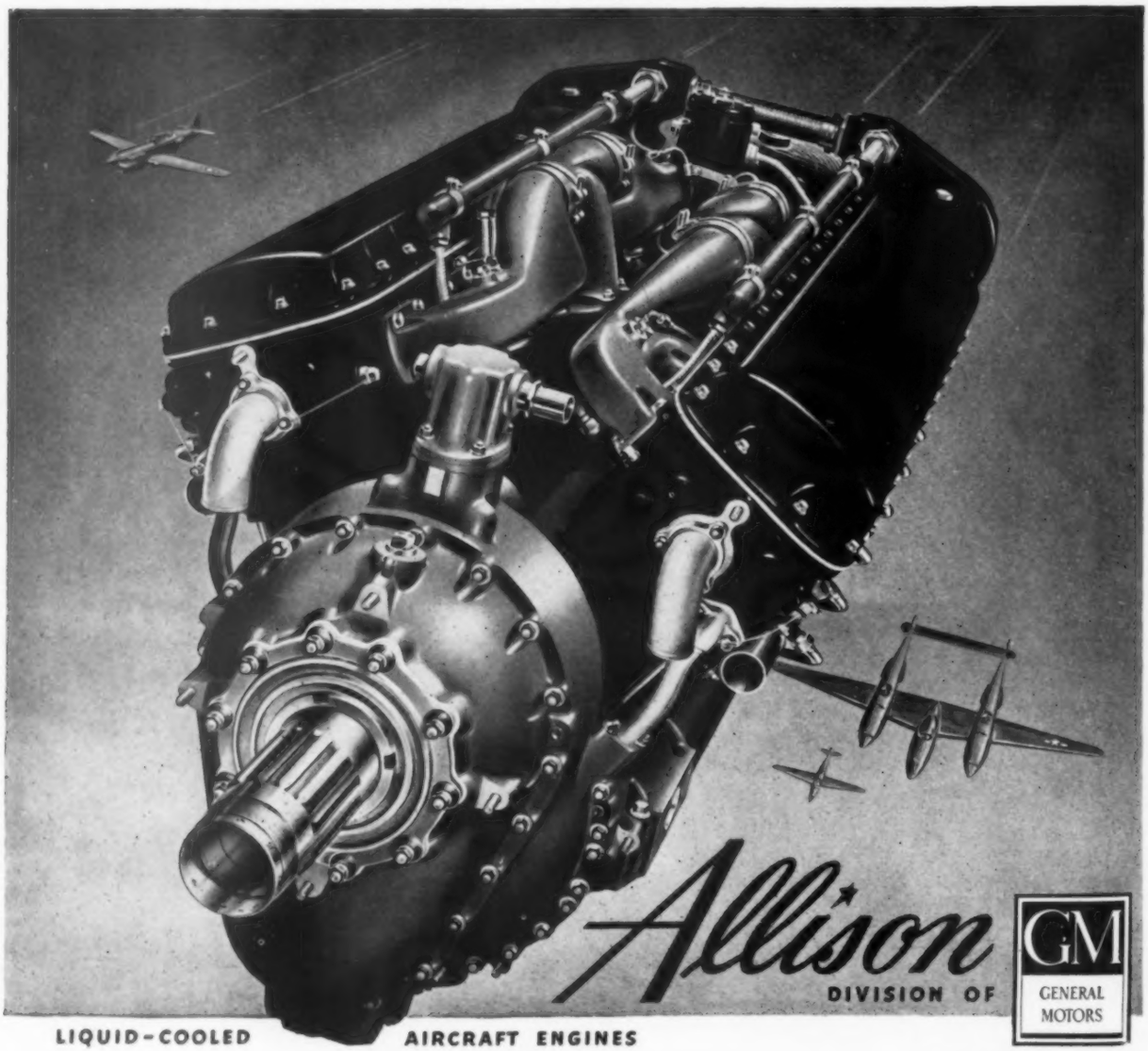
Here is meticulous machining.

These attributes today, combined with General Motors' faculty for mass manufacture, are giving substance to the purpose of our very being — our aim to build the finest aircraft engine the world knows.

★

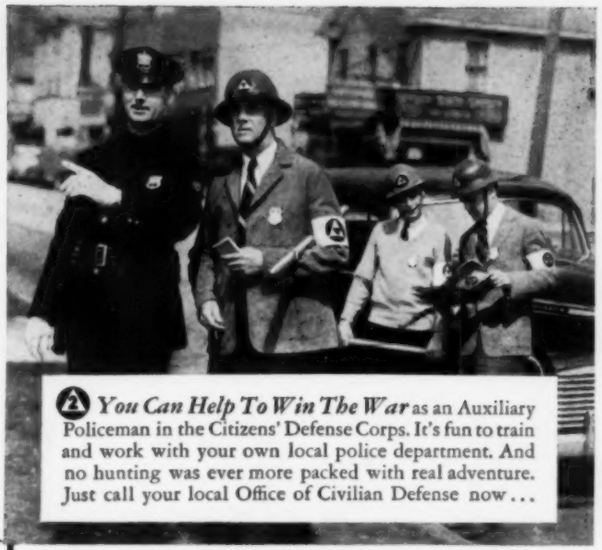
BACK THE ATTACK—
WITH WAR BONDS

POWERED BY ALLISON *P-38 — Lightning • P-39 — Airacobra • P-40 — Warhawk • P-51 — Mustang*



LIQUID-COOLED AIRCRAFT ENGINES

① *Sure You're Going To Miss It.* Autumn and outdoors. The woods and fields. Game and a good dog. Still nights under the stars. Flapjacks and a log fire. We understand. We miss it, too. But you won't mind nearly so much if you do some wartime hunting. Here's how...



② *You Can Help To Win The War* as an Auxiliary Policeman in the Citizens' Defense Corps. It's fun to train and work with your own local police department. And no hunting was ever more packed with real adventure. Just call your local Office of Civilian Defense now...

If there's NO HUNTING for you this year

③ *Then Throw Out All Your Old Ideas of Geography,* and think of all the distant spots you've always longed to hunt.

They'll all be *right next door* when this war's over, because then you'll be flying your own Cessna Family Car of the Air... that is, if you're over 16 and not too far over 60.

True enough, this airplane that everyone can buy and fly is going to be the Family Car *tomorrow*... but only because today we're devoting every ounce of our 32-year experience in aviation to the number one job of building twin-engined Cessna Bobcats for Uncle Sam's war birds. As soon as that job's done, *once and for all,* we can start building your Family Car of the Air for you.

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Cessna

Priority Delivery by Buying War Bonds Now... Be one of the first to own a Cessna Family Car of the Air after the war. Orders are bound to exceed production. But you can get a preferred listing for early postwar delivery. No obligation to buy. Costs you nothing. Write us today for the simple priority plan. CESSNA AIRCRAFT COMPANY, Box 1616-SF, Wichita, Kansas.

ARMY E NAVY
Cessna

SYMBOL OF AIRCRAFTSMANSHIP FOR THIRTY-TWO YEARS

The Birdmen's Perch

FLUTTER GOT AN IDEA!

He's been studying the pictures of American planes returning from missions with chunks out here, motors out there—but still flying. So his idea is to build the planes *without* the pieces that they seem able to dispense with and still fly. He says that will save materials and cut production time.

After going over pictures of dozens of Liberators, for instance, and getting a composite picture of what they can be minus—and yet be able to get home—he sketched this model.

Major Al Williams,

alias, "Tattered Wing Tips," Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh, Pa.

BRAINTWISTER

Three men of the 14th Air Force were playing the Chinese "finger game" with the understanding that the loser had to double the money of each of the other two. They played three games, each man losing one game and each man ending up with $24. All we ask you to do is figure out how much money each man started with.

If you give up (and you might as well), send for the answer. And if you want to become very popular with us, send along a Braintwister of your own—*including the answer!*

SHANGHAI JESTER

The other day, we put the Gulfhawk down on a 'port where some Chinese boys are being trained.

We got to talking about some of the more technical aspects of lubrication with three of the lads and before long we were going hot and heavy about refining techniques. Then one of them, Chan Bing, said, "Why doesn't some refiner take his best lubricant—and *then refine it again?* That way, he'd get a motor oil that was

about as free from carbon formers and sludge makers as possible!"

The Fei Lung (Flying Dragon) was so proud of his suggestion that we almost hated to tell him that was almost exactly the method used by Gulf in making Gulfpride. We told him that this Alchlor Process we use *did* get out extra carbon formers and sludge makers, and added that almost all the pilots in this country knew that.

He said he'd spread the word in *his* country, when he returned. So we made him the Chief Foreign Operations Perch Pilot. And promised to visit him after the war.

GULF IS IN THE COAL, COAL GROUND

Bet you never gave a thought to the lubrication problems of a coal mine.

But we did!

And we've lubricated more mine machinery than you could shake a stick of dynamite at. What's more, Gulf Lubricants, plus the recommendations of Gulf Service Engineers, have accounted for substantial increases in the output of many of these mines. And while there's a war going on, that means something!

We brought this up to point up the diversity of our lubrication experience. For while you Perch Pilots may know a good bit about Gulf Aviation Products, we want you to be acquainted with other war lubrication undertakings. We've told you about Gulf Super-Quench, Gulf Cutting Oil, Gulf Penetrating Oil, and a few others, in this corner.

Next month we'll tell you more.

Gulf Oil Corporation and Gulf Refining Company...makers of

GULF AVIATION PRODUCTS

OIL IS AMMUNITION—USE IT WISELY

Introducing the Navy's first land-based bomber

1. PV-1—That's the U. S. Navy's name for the Vega Ventura. It's a nautical version of the smashing new twin-engine bomber that is making a flaming Hell out of German industrial centers in almost daily R. A. F. raids. These deep-bellied Navy PV-1's strike at sea. They swoop in low from the sky with torpedoes for marauding surface craft or "ash can" depth charges for sub-busting.

2. Operating from land bases, the PV-1 is the first Navy bomber of its type to tackle the job of clearing Allied shipping lanes so that precious supplies may go through. Airfields on small island outposts are big enough for PV-1's, and droppable fuel tanks give the planes range to blast the enemy. Experts say it may be the answer to the United Nations' No. 1 war problem—licking the enemy submarine.

3. Like the Ventura it is versatile—capable of many jobs. Although designed primarily for bombing, 4000 h.p. can also be useful for towing targets for fast fighter plane practice, or for hauling troop-laden gliders.

4. Bigger, faster, and able to carry a larger load than the Lockheed Hudson, which they closely resemble, the PV-1 and the Vega Ventura retain the same qualities of dependability. Single spar wing construction, 100% X-Ray of all stress parts and ruggedness of design are the qualities of stamina that permit these planes to go through so much—yet bring their fighting crews home safely.

Lockheed Lightning Fighter

Ventura Medium Bomber

A subsidiary of Lockheed

Vega

Aircraft Corporation

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JUST AMONG OURSELVES *Editorials and Comment*

Tragic Loss to Aviation

A severe blow to aviation was suffered last month when a glider accident took the life of Richard C. du Pont. At the early age of thirty-two, he had contributed greatly to aeronautics. His All American Air Pick-Up system, pioneered in the Alleghenies, has been cited frequently for its efficiency and success and is now being studied for possible postwar expansion throughout the country. The ever-alert du Pont was devoting his energies to military gliding at the time of the accident, being special assistant to General H. H. Arnold on gliding. He baled out of a disabled glider near March Field, Calif., during a test flight but his parachute failed to open. The brilliant young airman had figured prominently in developing soaring and gliding during the last ten years, having established several records in soaring. Great accomplishments had been expected of Dick du Pont, particularly in postwar aviation developments. His talents will not be readily replaced.

Ploesti Cost Plenty

American airmen have distinguished themselves on many occasions, but a new high was reached recently when the Ninth Air Force destroyed most of the Ploesti refining facilities in Rumania. The stakes were high, and the 1,750 crewmen who took part knew the risks. Of the 175 Liberators which started, only 107 returned.

We listened the other day while one of the Ploesti pilots told his experiences. He analyzed the mission from a war bond salesman's viewpoint. Here are the dollars and cents costs of Ploesti:

600,000 gallons of gasoline (delivered abroad)	$ 600,000
Lubricating oil (delivered)	35,000
Bombs	700,000
40% loss of B-24's participating (175 total; lost 68)	19,800,000
Total cost of raid	$21,135,000

This figure, remember, doesn't include any investment in lives, in training or in property—merely the cost of the raid from the time of take-off to the time of the bombers' return.

The Ploesti raid was not only one of the most significant raids of the war, because it knocked out about one-third of Hitler's high octane gasoline and lubricating oils, but one of the most elaborately and carefully planned pieces of air strategy yet to emerge from the Allies' brilliant bag of tricks. For over a year the experts pored over the problems. After all details were worked out select crews spent an intensive six weeks bombing an exact replica of the Rumanian refineries constructed out on the African desert until they became perfect.

At the time (there might have been others since) the Ploesti adventure was the largest and longest "low-level" raid in history. The gang took off a little before seven in the morning and returned after nine that night — those who were fortunate enough to get back. They came into the area near the target twenty feet off the ground. With bomb bays down, the terrific suction actually yanked cornstalks into the Liberators' bellies as they roared over Rumanian fields. Many of the planes flew into their targets, while Me-110's and ack-ack provided most of the opposition.

For the Record

Another battleship, Italy's 35,000-ton *Roma*, has been sunk by aircraft. Wing Commander Herbert Law-Wright of the RAF, cruising in a reconnaissance plane above the Italian fleet the day it surrendered, saw a Junkers 88 sink the huge ship—with a single bomb. War Correspondent Milton Bracker of the N. Y. *Times*, who interviewed the observer, wrote: "Her anti-aircraft guns were blazing before she was struck. But the steel that she squirted into the sky was in vain. The German bomb struck the battleship amidships, or a little forward. She shook and quivered like a thing alive; she leaped slightly from the water. In an instant terrible clouds of smoke billowed over her superstructure. Six nine-inch guns in two forward turrets sagged and hung awry. In exactly twenty-one minutes from the moment of impact the 775-ft. ship, which carried 1,600 men, was beneath the surface."

Revving Up

Ice formations are produced on whirling propeller blades while in actual flight by means of this ingenious outrigger spray. Army Air Force engineers at Wright Field developed it to study icing at high altitudes. A camera, synchronized with propeller speed to take detailed photos of ice formation, records process while ice builds up and is rapidly thrown off. —Army Air Forces Photo.

HO HUM DEPT.: Remember how Blanche Noyes and the CAA set out seven years ago to spot air markers at fifteen-mile intervals over the countryside? Well, she had marked thousands of barns, depots, water tanks and town halls when the war came along. Poor Blanche had to call for help to take down those markers—the Army and Navy didn't want any Japs or Nazis taking advantage of the CAA's navigational aids. As time passed on, Blanche was finishing up the task of undoing what she had taken several years to do. Now the Army and Navy want the markers put back up, at least around training bases to guide training flights. So now Blanche is back at her old job, putting up markers. This time they'll stay, she hopes.

LANGUAGE LESSON: As should have been expected, American and British aviation radio chatter didn't mix very well when combined operations got under way. So a blending of radiotelephone phrases resulted. It worked so well it is now universal—even the civilian pilots of the CAP are using it, we hear. Here are a few pick-ups for your vocabulary:

OVER: "My transmission is ended and I expect a response from you."

OUT: "This conversation is ended and no response is expected."

ACKNOWLEDGE: "Let me know that you have received and understood this message."

WAIT: "I must pause for a few seconds." (If the pause is to be longer than a few seconds, "WAIT OUT" should be used.)

(Continued on page 12)

WILL POSTWAR AIRLINERS FLY THESE LEVELS?

30,000 FEET

25,000 FEET

20,000 FEET

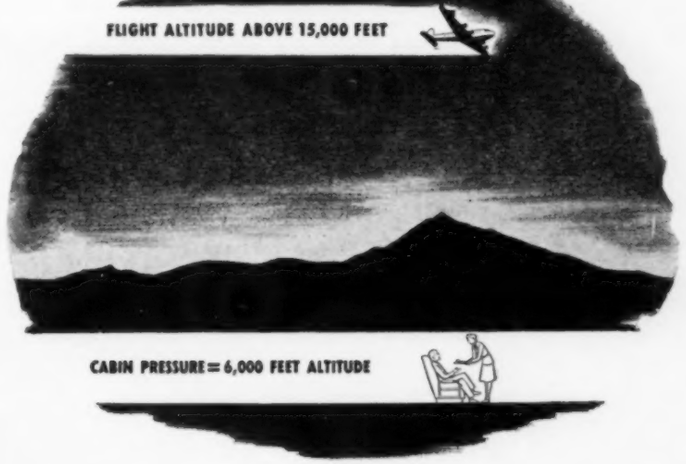
15,000 FEET

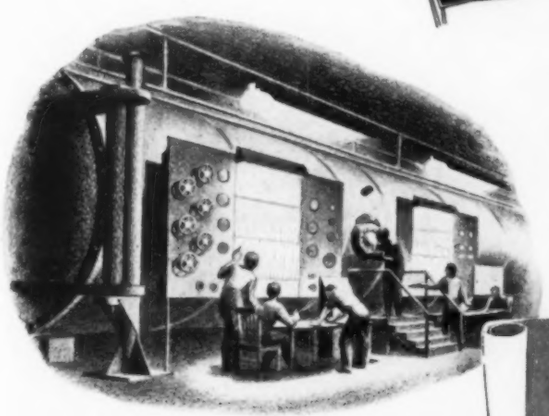
"It's something airline operators are looking forward to." Flying the higher altitudes will step up speed... cut fuel consumption... make possible smoother flights above storm conditions.

Up to now, passenger comfort has set the ceiling. For above 8,000 feet, most people's ears begin to pop. Above 10,000, they become sleepy and dizzy. These discomforts—due to lowered air pressures—must be overcome before passengers will take to high-altitude air travel.

Pressurized cabins will pave the way

They will eliminate these discomforts by *holding pressure constant* during take-off and descent. They will *adjust pressure* gradually during flight from low to higher altitude airports. They will even be able to hold sea-level altitude in the cabin while the airplane flies thousands of feet higher.





MUCH of the development work on cabin pressure control has been carried on here in the AiResearch "Stratolab". Our engineers have created altitudes as high as 65,000 feet—temperatures below minus 90° F. And they've found ways to control them!

The success of their engineering now assures pressurized cabins for postwar airlines. Information is available to aircraft manufacturers and airline executives.

AiResearch
MANUFACTURING COMPANY
LOS ANGELES • PHOENIX
DIVISION OF THE GARRETT CORPORATION

"Where Controlled Air Does the Job" • Automatic Exit Flap Control Systems • Engine Coolant Systems
Engine Oil Cooling Systems • Engine Air Intercooling Systems • Supercharger Aftercooling Systems

REVVING UP

(Continued from page 10)

SAY AGAIN: "Repeat."

I SAY AGAIN: "I will repeat."

HOW DO YOU HEAR ME? "Can you hear me?"

CORRECTION: "An error has been made in this transmission. The correct version is . . ."

WRONG: "What you have just said is incorrect. The correct version is . . ."

THIS IS: (Used instead of the term "from." Example: "Control Tower—this is Army 1234" or "Army 1234—this is Control Tower.")

ROGER: "I have received all of your last transmission."

WILCO: "Your last message (or message indicated) received, understood and (where applicable) will be complied with."

★ ★ ★

HEROES IN OIL, GREASE: Awards of merit for outstanding records as "soldiers of production" have been presented by the Department of Commerce to seven aviation mechanics selected from 3,000 mechanics engaged in maintenance of planes used in the CAA War Training Service, currently training over 27,000 pilots for the Army and Navy. They are Edward Church of Jennings Brothers Air Service, Fitchburg, Mass.; Clarence M. Webb of J. Lewis Hilbert Service, Johnson City, Tenn.; Donald Griffith of Queen City Flying Service, Cincinnati, O.; Sam Millard of Spartan School of Aeronautics, Tulsa, Okla.; Deane C. Gilmore of Graham Flying Service, Sioux City, Iowa; John H. Hawkins of Pathfinder Flying Service, Carson City, Nev., and Harold Hahn of Wallace Air Service, Spokane, Wash.

★ ★ ★

THE FEW: The Curtiss folks, deservedly proud, totalled up the results of fifty separate "combats" from September 29, 1939, to July 24, 1943, and found a total of 457 P-40's and Hawk 75A's engaged 1,257 enemy planes, of which 420 were shot down with a loss of only thirty-one Curtisses. That's a score of 13½ to 1. Here are six of those epic sky battles:

Date	Theatre	Planes Participating P-40's	Planes Participating Enemy	Planes Destroyed P-40's	Planes Destroyed Enemy
Sept. 29, '39	France	5	9	2	5
Dec. 25, '41	Burma (AVG)	13	78	2	23
Jan. 8, '42	Africa	10	50	1	7
Feb. 25, '42	Burma (AVG)	7	60	1	23
Dec. 7, '42	So. Pacific	4	30	0	4
April 14, '43	Africa (Cape Bon)	48	100	6	74

TOMORROW'S PLANE TODAY: In all the talk about the wonderful airplanes we'll have after the war, there's ample promise of family air sedans as economical to fly as auto driving on weekends. Allen Guiberson of Dallas doesn't have to wait until that happy far-off day. His 4-passenger SR-9 Stinson gull-wing recently made the round trip between Dallas and Dayton, Ohio, at a fuel cost of only nine mills (less than a penny) per mile. Here are the figures: Flying hours 15 hours 58 minutes, average speed 109.3 mph, gallons of fuel consumed 205, miles flown per gallon of fuel 8.3, average cost of fuel per gallon 7.3 cents, total cost for fuel $15.04, cost per mile for fuel less than nine mills.

The engine was a 310-hp. Diesel, which replaced a 330-hp. gasoline engine the Stinson originally was equipped with. Guiberson builds the only radial, air-cooled Diesel engine for aircraft flying in America today with a CAA Approved-Type certificate. It can be seen almost any day flying in and out of Dallas airports as Pilot Austin Goodwin builds up the hours on it. It's not a postwar promise—it's today's fact.

The Guiberson Diesel Stinson and Pilot Goodwin

WPB Amends P-47 Preference Rating for Civil Aviation

All aircraft owners, operators and repair shops who have not already done so should secure the new WPB Preference Rating Order P-47 together with Form WPB-1747 in order to guarantee allotments of materials. The new P-47 lays down the law for the scheduling of materials to manufacturers and unless complied with by all affected, manufactured parts in any quantity won't be available.

Limited Preference Rating Order P-47, amended as of last August, reads as follows:

General Preference Rating Order P-47—(a) Purpose and scope. The purpose of this order is to provide persons operating civilian type aircraft with a uniform procedure for obtaining material for the operation of aircraft and aircraft facilities, both in the case of controlled materials obtained by use of allotment symbols under the Controlled Materials Plan, and in the case of materials or products, including components, obtained by preference ratings.

(b) Definitions. (1) "Aircraft facility" means any machinery, material, equipment, or structure, used in connection with the operation or shelter, or the maintenance or repair of aircraft.

(2) "Operator" means any individual partnership, association, business trust, corporation, or any organized group of persons (whether incorporated or not), any air carrier holding a certificate of necessity from the Civil Aeronautics Board, any state or local governmental agency, any United States Governmental Agency, other than the Army or Navy of the United States, engaged in the operation of aircraft, or in the business of maintaining or repairing aircraft. Operator, as herein defined may include foreign operators and domestic operators carrying on business outside of the United States.

(c) Application for material. Each operator may file Form WPB-1747 in accordance with the instructions accompanying the form, for the material, parts and products required for operation of aircraft and aircraft facilities. The War Production Board may approve the acquisition of materials, parts, and products, and will assign preference ratings for approved materials other than controlled materials, will authorize the use of the allotment symbol MRO (P-47) for approved controlled materials, and will assign a serial number on the form.

(d) Restrictions on the acquisition of materials. No operator may apply ratings or use any allotment symbol to acquire any material, parts or products in excess of the amounts approved, or at a time other than that specified in the approval.

(e) Acquisition of materials. Operators may obtain materials approved on Form WPB-1747 by placing on their purchase orders the following certification, (or the alternative form of certification provided in CMP Regulation No. 7) signed manually or as provided in Priorities Regulation No. 7:

MRO (P-47 Serial Number .....) [Insert Preference Rating]. The undersigned certifies, subject to the criminal penalties for misrepresentation contained in section 35 (A) of the United States Criminal Code, that the items covered by this order are within the amounts approved by the War Production Board under Preference Rating Order P-47, and are to be used for a purpose so approved.

Name .....

By .....

Authorized official.

Date .....

A purchase order bearing this certification shall be deemed an authorized controlled material order for the purpose of all CMP Regulations.

(f) Penalties for misrepresentation. (1) The placing of any order bearing a certification or symbol, as provided by this order, shall constitute a representation, subject to the criminal penalties of section 35(A) of the United States Criminal Code (18 U. S. C. 80), that the person placing the order is entitled, under the terms of this order, to use of the symbol or preference rating indicated thereon.

(g) Inventory restrictions. No person shall receive any delivery if acceptance thereof would increase his inventory above a practicable working minimum, as provided in § 944.14 of Priorities Regulation No. 1, or would exceed the inventory limitations prescribed for such person by CMP Regulation No. 2 or by any other applicable regulation or order of the War Production Board.

(h) Applicability of other orders and regulations. (1) Nothing in this order shall be construed to relieve any person from complying with any applicable regulation or order of the War Production Board (including orders in the "E," "L," and "M" series) or with any order of any other competent authority.

(2) No operator may acquire material by use of any preference rating or allotment symbol assigned by any order in the "P" series except this order, by CMP Regulation No. 5 or No. 5A, or on Form PD-408.

(i) Records. Each person acquiring materials, parts, or products, pursuant to this order, shall keep and preserve for a period of not less than two years accurate and complete records of all such supplies so acquired and used, which shall, upon request, be submitted to audit and inspection by duly authorized representatives of the War Production Board.

(j) Communications. All communications concerning this order should be addressed to: War Production Board, Washington 25, D. C., Ref. P-47.

WRIGHT POWERS THE TONNAGE OF THE AIR

The Extra Passenger in a Wright Cyclone

Power per pound is the general criterion for aircraft engine valuation. Take-off power, size, life, reliability and altitude performance are important criteria but other things being equal there is no substitute for "less weight." In Cyclone 9 – powered planes the weight saving equals an extra passenger per engine.

Ten years ago, the Cyclone 9 weighed 1.2 pounds per horsepower. Since then, 600 HP has been added at a cost of only 420 lbs. in materials, cutting the weight ratio to .97 pounds per horsepower.

Wright engineering developments made this power gain possible. The Dynamic Damper, for example, added 20 pounds weight but permitted an initial increase of 100 horsepower and opened the way to the present high ratings. Today's Cyclones use a steel crankcase which not only permits another 100 horsepower increase but is actually lighter than the forged duralumin case. Tripling its fin area, the Cyclone cylinder now produces 150 horsepower in the same cubic displacement which developed only 83 horsepower in 1933.

Cyclone crankshaft with Dynamic Damper

Cylinder development 1933 — 1943

Thus Wright engineers have steadily extracted more and more power for smaller expenditures of material, so that today's Cyclone 9 is 13.5% lighter than any other engine in the same power class. This 13.5% means 175 lbs. advantage—or one passenger per engine—a payload bonus creating revenue dollars for the commercial operator.

★ ★ ★

Wright Cyclones pay their way.

Cyclones and Whirlwinds · Light · Compact · Powerful **WRIGHT** *Aircraft Engines*

MUSTANG'S ROLLS-ROYCE IS MASS-PRODUCED BY PACKARD

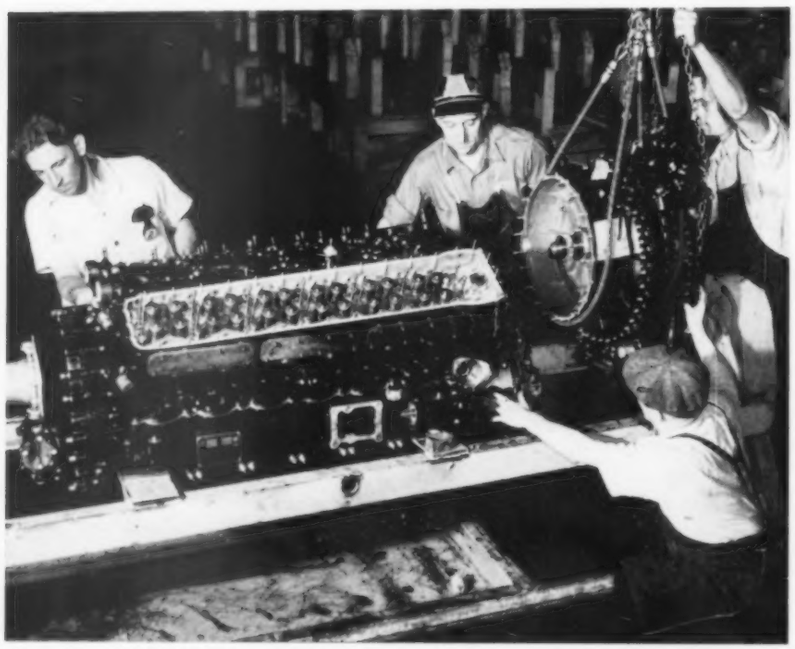
LAST year's North American P-51 Mustang won acclaim as one of the best "low-altitude" fighters in Allied operations. Its design was responsible for most of the admiration. Recently the Mustang climbed into the high-altitude, "400-miles per hour" bracket and some admirers pictured it as being tops, bar nothing.

Behind the transition was the Rolls-Royce Merlin engine with two-speed, two-stage supercharger also designed by Rolls-Royce. It raised the Mustang's rated power to 1,520-h.p. The same type of engine (vee-type, twelve-cylinder, liquid-cooled) powers England's Spitfires, Mosquitos, Lancasters and Wellingtons.

The Mustang's Merlin is built by Packard, which redrew two thousand "left-handed" British blueprints, changed metric measurements into inches and altered designs to accommodate American accessories to put the engine in mass production. Of the Merlin's 13,000-odd parts, some are machined to a fineness of four micro-inches (a micro-inch is one-millionth of an inch). Seventy-one different kinds of metals and alloys are used.

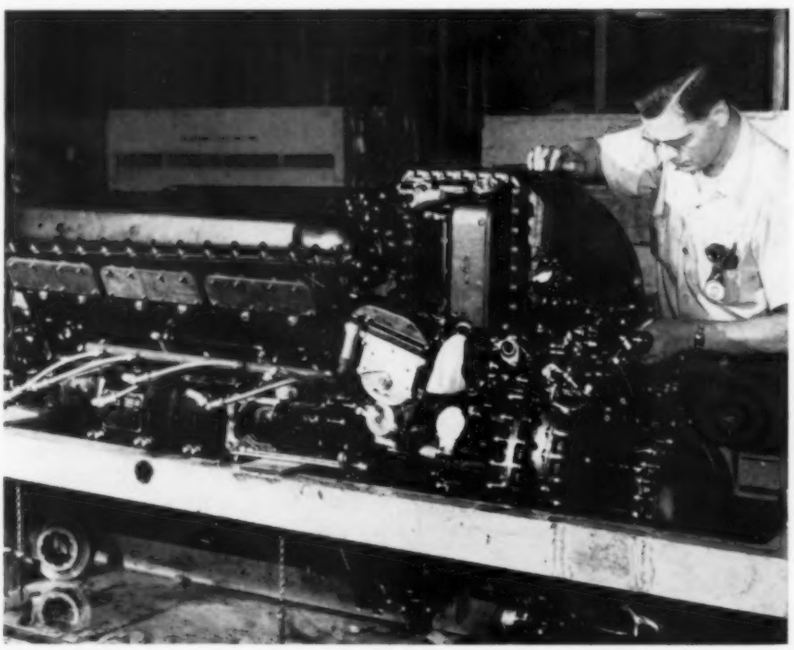
Packard also mass-produces the supercharger, which is installed on the rear end of the Merlin. It is gear-driven and automatically-controlled for varying altitudes. Its two rotors revolve nearly 25,000 times per minute—a speed of about 867 miles per hour, with the outside rim traveling 1,271 feet per second.

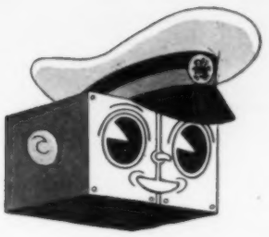
★ ★ ★



GEAR-DRIVEN two-speed, two-stage supercharger is installed (left) at rear end of massive 1,520-h.p. Rolls-Royce. Tail bearings (below) of Packard-built blower have smoothness measured to one-millionth of inch and limits that are held to ten-thousandths of inch.

AFTER-COOLER, located at top rear (right), of Merlin takes off heat from air compressed by blower. Asbestos gloves (below) are used in fitting impellers which are heated to insure tightness upon cooling.





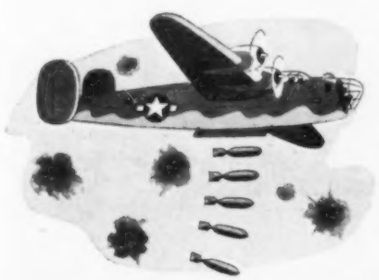
Song of Elmer... the pilot who never gets tired

He holds no place in the Officer's Mess
for he does not sleep or eat,
He's the Quietest Birdman ever took
his place in a cockpit seat—
He joins no laughter, nor shoots the breeze,
nor whistles, nor hums, nor sings,
But he's flown more planes than any man
who ever wore pilot's wings...

...has Elmer!

He's an old, old hand, as old hands go
in a young man's game today,
For he circled the globe in 'Thirty-three
with Post in the Winnie Mae—
He's an Army man, he's a Navy man,
and he flies with the R.A.F.,
And the Yankees say, and the British say
of pilots, he's the best...

...is Elmer!



Often when bombers have levelled off
for the last tense bombing runs,
And the bomb-bay doors are opened wide,
and the gunners man the guns,
When the flak comes up as the bombs
go down, and the target zone is clear,
Then who is the pilot who holds the course
set by the bombardier...?

It's Elmer!

He can hold a plane on a chosen course
while the crewmen rest or sleep,
He can level off for a landing glide,
or bank her sharp and steep—
He can spiral up, he can spiral down,
or hold her level and true—
His hydraulic muscles never tire
the way human muscles do...

...not Elmer's!

And so bombing, transport, and cargo
planes, take Elmer on every flight
To spare the pilot and rest the crew
for emergency, storm, or fight—
He needs no rest, for he never gets tired,
being only a cold machine,
Just wheels and wires and gears and cogs,
with brackets and stuff between...

...is Elmer!

He wears no medals, he holds no rank.
Why should he? He cannot feel
The courage that flares in time of need
for he's only alloy and steel!
So when *nerve* is needed, the bombardier,
the pilots, the gunners, too,
The navigator, and all the rest,
are the boys who pull her through...

...NOT Elmer!

SPERRY

GYROSCOPE COMPANY, INC.

is proud to be manufacturing the famous Sperry Gyropilot for the Armed Forces of the United Nations.

Brooklyn, N. Y.
Division of Sperry Corporation

• *Reprints of this poem — suitable for framing, with signature removed — may be obtained without charge by writing the Sperry Gyroscope Company.*

This advertisement is one of a series which will appear in national magazines and newspapers this year as Consolidated's contribution toward a clearer public understanding of "aviation geography."

This Soviet worker in Yakutsk, Siberia, lives only 28 hours flying time from the Washington, D. C. airport.

It's 57 hours' flying time from Kansas City to this Chinese student's home, outside Chungking.

The office of this newspaper publisher in Calcutta, India, is 41 hours' flying time from Times Square, N. Y.

This Alaskan Eskimo lives near Fairbanks—15 hours' flying time from the Chicago airport.

A 23-hour flight from Boston will put you in the office of this wholesale coffee dealer in Sao Paulo, Brazil.

The Pacific atoll where this Fiji Islander lives is only 54 hours' flying time from Denver.

No man on earth lives more than 60 hours from your local airport...

"A LOT OF THINGS are different in India than they are back home in Altoona," wrote a 19-year old sergeant in the U. S. Air Forces to his mother in Pennsylvania.

Never before in his life had this boy travelled beyond Pittsburgh — until he flew to India in a Liberator bomber.

To him — and hundreds of thousands of home-town American boys like him — India was a place "off there somewhere." He'd seen it in the newsreels and travelogue films. In his geography book he'd learned something about India's crops and minerals and untold riches, and the funny way the people dressed.

The world as it really is

Now his letters from overseas — telling how people talk and work and live in a strange land he never dreamed he'd see — *are penetrating into the lives and thinking of his family and friends in the town where he grew up.*

This is happening all over America today And when our boys come home again — from India and China and Britain and Dutch Harbor and Australia and North Africa — they'll think of the world as they know it *really is.*

Not as isolated continents or separate hemispheres, but a clustering of nations whose *individual* welfare, in the peace to come, will depend upon the welfare of them *all.*

They know it can't be otherwise, when *no spot on earth is more than 60 hours' flying time from your local airport!*

In such a world, right now, we face

CONSOLIDATED VULTEE AIRCRAFT

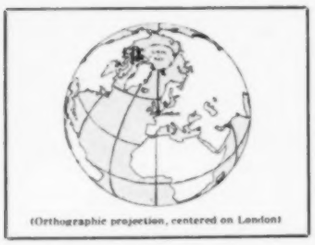
Your sales manager in Brisbane can attend a meeting in San Francisco on short notice. Flying time: 35 hours.

the necessity of waging and winning a global war. Tomorrow — in a world shrunk still smaller because of even swifter long-range planes to come — we and all other nations must somehow contrive to get along together as neighbors.

Air power — for peace

There are bewildering problems ahead. But one thing is certain. The plane — by accelerating the interchange of men, mail, merchandise, ideas, culture, and beliefs — will help to bring about a greater understanding between the peoples of the earth.

And without understanding, there can be no lasting peace.



(Orthographic projection, centered on London)

A plane recently *flew the 1400 air miles from London to Moscow on a special mission in the morning, returning that same afternoon. Top speed: 400 M.P.H.*

(Polar azimuthal equidistant projection)

Today's planes, *with their tremendous speed and long flying range, need not follow old established trade routes. The 9400-mile sea route from New York to Bombay is about a 3-week voyage, but the air route is only 7790 miles. Flying time: 39 hours or less.*

QUICK FACTS FOR AIR-MINDED READERS

Consolidated Vultee designed and perfected the long-range Liberator bomber — was the first to turn out multi-ton bombers in volume production on a moving assembly line.

• • •

Because teamwork means more bombers and an earlier victory, the Consolidated-designed Liberator is also being produced by Ford, Douglas, and North American.

• • •

Liberators and Catalinas have helped to provide a "complete shore-to-shore air cover" spanning the Atlantic as protection for convoys against Nazi submarines, according to joint statement by British Admiralty and Air Ministry.

• • •

All transport planes, including the Liberator Express, are being equipped to carry standard stretchers for the evacuation of wounded, according to the Office of War Information.

• • •

To protect Australia's 11,000-mile coastline, the Royal Australian Air Force chose Catalinas as ships that can regard "journeys of 2000 miles or more as routine. Catalinas can remain in the air for thirty hours and can reach Australia's remotest bases and return without refueling," according to the Commonwealth of Australia Department of Information.

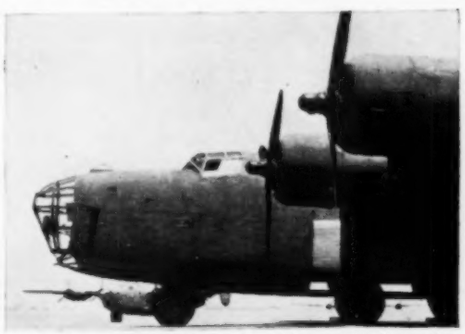
• • •

At the end of 1943, the United States will have about 865 airports, each with paved runways of 3500 feet or more. This compares with less than 100 such airports in 1940.

• • •

There are 11 Consolidated Vultee plants in the United States. If these 11 plants could be put under a single roof, they would occupy a building 3 miles long and 5 city blocks wide.

In addition *to the Liberator bomber, Liberator Express transport plane, and the Coronado and Catalina patrol bombers, Consolidated Vultee also builds dive bombers, trainers, and torpedo planes.* Above: *the Valiant — basic trainer widely used by the Army, Navy, and Marine Corps.*



"O.K. for take-off!" *Another huge Liberator bomber rolls off Consolidated Vultee's moving assembly lines into the hands of the test pilots. On every aerial battle front, the speed, range, fire power, and precision bombing of the 4-engine Liberator is helping to transfer the Axis dream of victory into a nightmare.*

CONSOLIDATED VULTEE AIRCRAFT CORPORATION

San Diego, Calif. • Vultee Field, Calif. • Fort Worth, Texas
New Orleans, La. • Nashville, Tenn. • Wayne, Mich.
Allentown, Pa. • Tucson, Ariz. • Elizabeth City, N. C.
Louisville, Ky. • Miami, Fla.

Member, Aircraft War Production Council

LIBERATOR (4-engine bomber) — CORONADO, CATALINA, (patrol bombers) — P4Y (anti-submarine plane) — LIBERATOR EXPRESS (transport) — VALIANT (basic trainer) — VENGEANCE (dive bomber) — SENTINEL ("Flying Jeep") — RELIANT (navigational trainer)

What They Want From You— You Can Get From Us

Exterior Oklahoma City Warehouse

Office and Sales Room Oklahoma City Branch

After more than eleven years' experience in supplying parts to the Aircraft Industry of America, we have a pretty good idea of the material you are likely to need . . . and the need for speed in getting it to you.

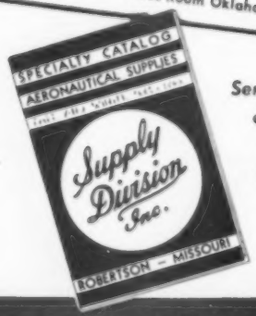
So, for the convenience of you who are responsible for keeping flyers in the air—Dealers, War Training Service Contractors, members of the C.A.P.—we maintain *two* warehouses filled with bolts, nuts, accessories and specialties of all kinds.

Contact either branch for whatever you want in a hurry . . .

LAMBERT AIRPORT, ROBERTSON, MISSOURI (St. Louis)
Phone Terryhill 5-2902

OKLAHOMA CITY, OKLAHOMA, 108 W. Grand Avenue
Phone 3-6224

. . . and count on receiving prompt, understanding attention with—when possible—"same day" delivery service.



Send for a copy of this new Specialty Catalogue

SUPPLY
Division Inc.
LAMBERT AIRPORT, ROBERTSON, MO.

YOUR *"Warehouse Annex"* FOR AERONAUTICAL SUPPLIES

POWER TO WIN
Powered by Continental Red Seal Engines, these highly maneuverable trainers fly with the steady dependability that inspires confidence in thousands of youngsters streaming through our military schools.
ARMY E NAVY
Awarded to the Detroit and Muskegon Plants of Continental Motors Corporation for High Achievement.
Continental Motors Corporation
Aircraft Engine Division
MUSKEGON, MICHIGAN
Your Dollars Are Power, Too!
. . . Buy War Bonds

Note unretouched micro-photographs of 180° root bend test. Cracking and checking often result from welding with good commercial "all-purpose" fluxes.

NO TOXIC FUMES FROM SOLAR WELDING FLUX!

Under normal ventilating conditions, welders work comfortably without wearing masks where Solar Flux No. 16GH is on the job.

Solar Flux No. 16GH was developed in Solar Laboratories specifically for the specialized welding of stainless steel and similar alloys—helps prevent cracking, checking and burning.

Solar Flux No. 16GH sticks better to underside and edges of metal during welding and helps prevent "burning" (oxidation). It can be applied days before welding and holds fast despite frequent handling.

Solar Flux promotes metal flow when applied to welding rod—protects rod from oxidation. Absolutely no carbon pickup results from the flux itself.

It can be used with most welding processes including oxyacetylene, atomic hydrogen arc and metallic arc. Qualifies under appropriate Army and Navy specifications. Write for details.

ARMY (E) NAVY

SOLAR

WELDING FLUX NO. 16GH

SOLAR AIRCRAFT COMPANY ★ SAN DIEGO 12, CALIFORNIA

MARTIN USA
REG. U. S. PAT. OFF.

"Another Martin First!"

AMERICA'S FIRST *power-operated aerial gun turrets were built in 1937 by Martin for its PBM-1 Navy patrol bomber (shown at left). Martin pioneering paid big dividends to America's war effort.*

U. S. Planes Pack a Potent Punch thanks to MARTIN-MADE GUN TURRETS

HOW does it happen that Martin, long famed for its fighting planes, is now also one of the world's largest manufacturers of power-operated aerial gun turrets? As far back as 1937 Martin engineers had foreseen the need for powered gun turrets and built America's first for their PBM-1 patrol bomber. When, in 1940, General Arnold proclaimed power gun turrets a "must," Martin was ready with actual experience and production know-how. Results: Martin is now mass-producing turrets not only for Martin aircraft, but for many other U. S. types as well. When you see pictures of high-speed bombers, the chances are 9 out of 10 that they are defended with Martin turrets.

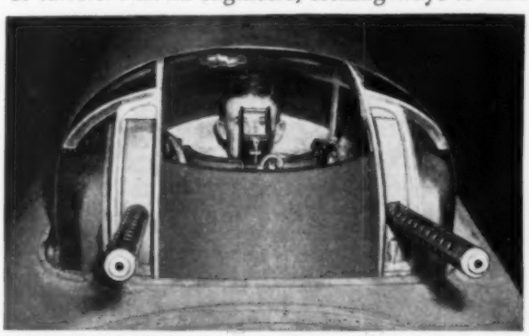
Mass-Producing Gun Turrets

To give U. S. bombers a pulverizing punch and to lessen the need for fighter escort, Martin has turned its entire Sinclair division over to the manufacture of turrets. Martin engineers, seeking ways to turn out turrets faster, achieved these results. The inner ring was cast as a single unit . . . moving assembly lines were perfected . . . and the "chassis" of the turret was cast in one piece, a feat which many experts had deemed impossible. Today, turrets . . . both electrically and hydraulically powered . . . are rolling from Martin assembly lines to make U. S. bombers feared by enemy airmen.

New Improvements

Hardly a week passes without changes or improvements being made in Martin turrets, to keep well ahead of the enemy. Plastics are being utilized to save metal . . . added comfort and protection are provided for gunners . . . and in numerous other ways Martin gun turrets are being improved to give U. S. planes a punch that spells "k.o." for the Axis—and Victory for US.

THE GLENN L. MARTIN COMPANY, BALTIMORE
THE GLENN L. MARTIN-NEBRASKA COMPANY—OMAHA



WICKED WALLOP is packed by these twin 50's in the Martin turret of a Martin B-26 Marauder. At high altitudes, where the slightest exertion is an effort, power turrets, easily operated by a twist of the wrist, are vital to Victory.

TORRENT OF TURRETS pours from Martin factories, via moving assembly lines like this. Simplified design and advanced tooling boost Martin output. At end of line, guns are installed and turrets are ready to do business with Hitler.

Martin
AIRCRAFT
Builders of Dependable Aircraft Since 1909

FOR FIGHTING FLYERS NOW . . .

FOR ALL FLYERS LATER

Hundreds of aviation experts on our staff are becoming seasoned veterans in their highly specialized jobs, as Georgia Air Service, Inc., continues to concentrate on Primary Training for Army Air Forces pilots. Without loss of a moment's time from today's job . . . we are facing toward tomorrow . . . ready to convert the knowledge and skill of this organization to the flying needs of a progressive nation . . . in peace.

★ ★ ★ ★ *SOUTHEASTERN AIR EXPRESS, INC., a subsidiary of Georgia Air Service, Inc., has "on the drawing board" plans to pioneer the development of feeder lines throughout the Southeast. This service is in addition to our present expanding fixed base operations . . . designed to offer the best in sales, service and maintenance all over Dixie.*

GEORGIA AIR SERVICE

GEORGIA AIR SERVICE, INC.

ATLANTA, GEORGIA

Flight Contractors to U. S. Army Air Forces, Bennettsville, S. C., and Jackson, Tenn.

Lessee-Operator Rickenbacker Field (Cobb County Airport)

Nightwatchman on Duty

American boys are sleeping down there on that tiny dot of land set in the endless nothingness of the Pacific.

They can sleep because they've got a nightwatchman on duty up here patrolling the skies. A fighter pilot of the Army Air Forces flying an Army Bell Airacobra, he's an alert, a deadly efficient nightwatchman.

His plane gives him visibility unsurpassed by any single engine fighter in the world. His plane has blinding speed, modern instruments for night flying and a two-way radio. At his fingertips are controls for a cannon and a battery of machine guns.

He can find the enemy, sound an alarm—then deal smashing blows.

Rest easy, down there below...the nightwatchman is on duty.

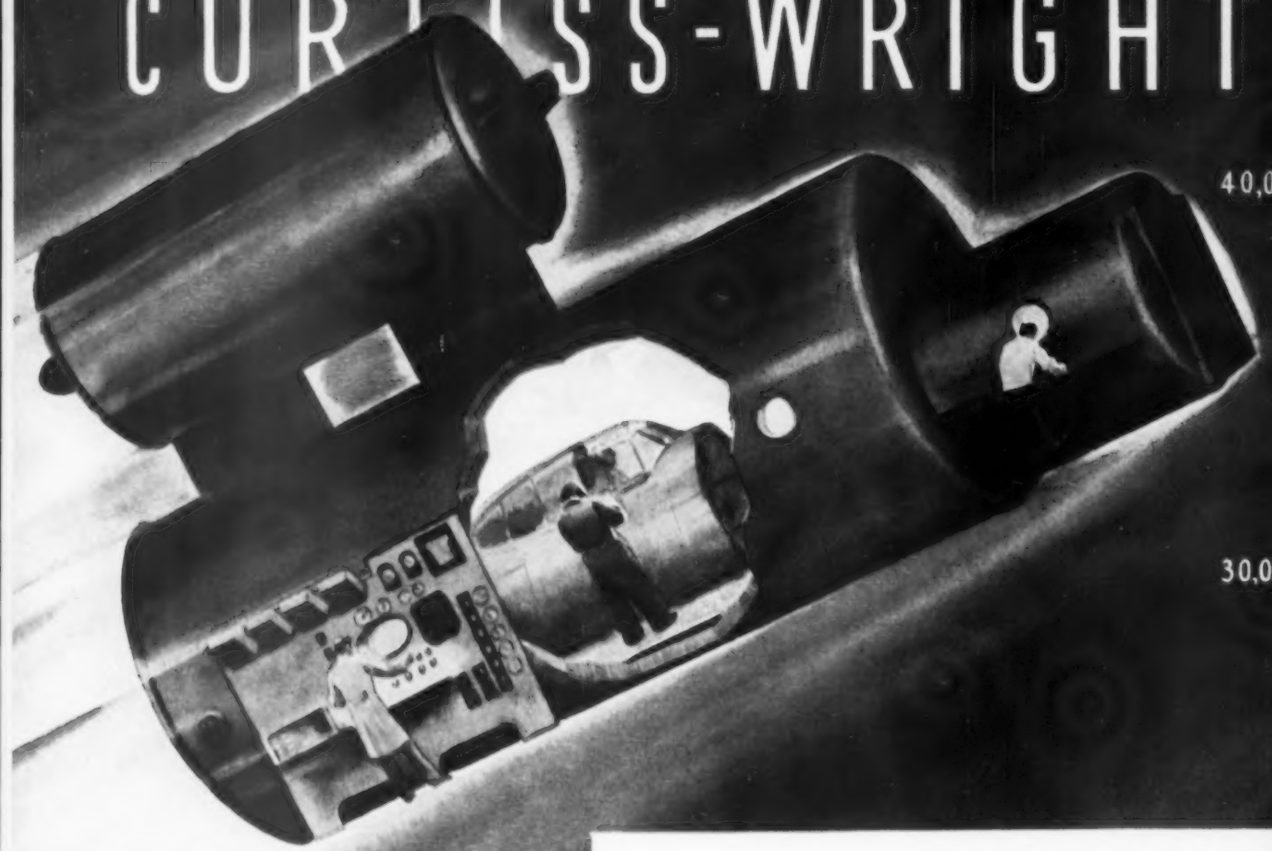
WHEN it's over, over there, American aircraft will have new duties in peaceful travel and commerce. In designing and building the first Airacobra...in constantly improving it...we've learned plenty about making planes simpler, safer, more fool proof and trouble free. You'll see what we mean. © Bell Aircraft Corporation, Buffalo and Niagara Falls, New York.

BELL *Aircraft*

AIRACOBRAS for victory—future planes for peace

BUY WAR BONDS AND SPEED VICTORY

CURTISS-WRIGHT



SUPREMACY
in the Stratosphere

Aviation's sights today are trained on the stratosphere, the key to military and world trade supremacy.

But before science can conquer the rarefied, sub-zero heights of the earth's ocean of air, answers must be found to a multitude of problems, for planes and men will be entering a sphere considerably beyond today's limits of flight.

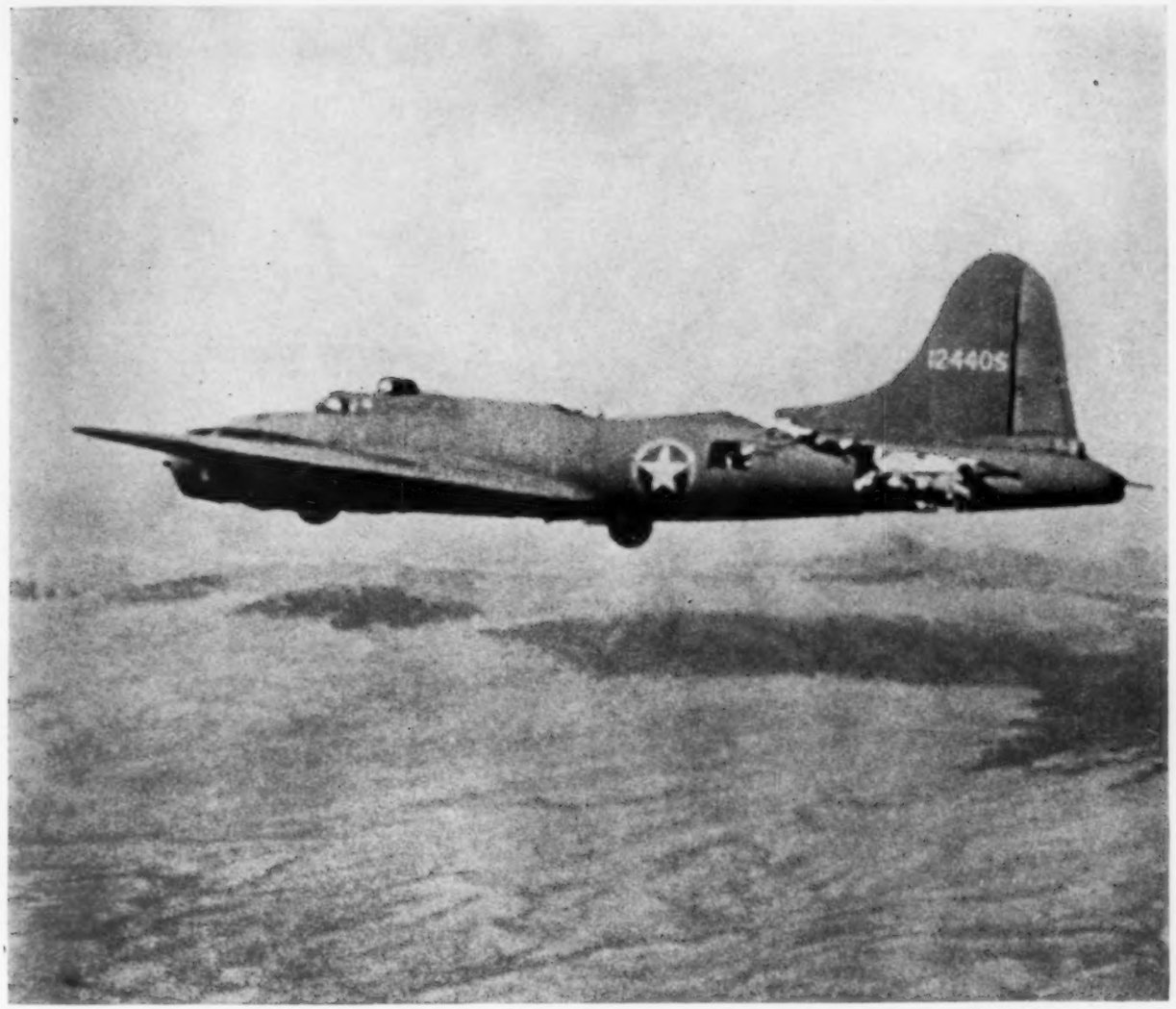
To speed this epic exploration, Curtiss-Wright has completed the world's largest altitude chamber—where, without leaving the ground, airplane cabins and fusilages with all their complex equipment can be tested exhaustively under stratospheric conditions.

It is, we believe, a contribution of far-reaching importance to America's leadership in aviation.

CURTISS-WRIGHT
Corporation
AIRPLANE DIVISION
BUFFALO • COLUMBUS • ST. LOUIS • LOUISVILLE

Member: Aircraft War Production Council, East Coast, Inc.

Nine minutes after this scientist steps into the Curtiss altitude chamber he can reach flying conditions equivalent to those found nearly eight miles above the earth's surface in rarefied air 70 degrees F. below zero.



Buy War Bonds and Stamps

No Achilles Heel

This slashed-in-two Flying Fortress* theoretically should not fly. There had been stiff fighter opposition. In the melee, a Messerschmitt, crazily out of control, crashed into it.

The German plane was destroyed on impact. The Fortress' fuselage was ripped diagonally from top to bottom. Control surfaces were carried away. The tail gunner, suddenly imperiled in his wabbling section, crawled forward over the narrow floor structure that held the parts together. And the Fortress flew steadily for an hour and three-quarters —back to her base for a perfect landing!

Often the question is asked about Boeing Fortresses: *"How can they do it?"* One Fortress came home with 2000 bullet holes, and with big areas of both wing sections shot away. Another had a hole in the fin "large enough for the navigator to walk through." Others have come in with rudder and elevator controls sheared by gunfire.

How can they do it?

One reason is Boeing design. The Fortress has no Achilles heel, no highly vulnerable spot for the enemy to attack. No single structural member has to carry the entire load for its section; even when large portions of the plane are badly damaged, the Fortress usually is strong enough to remain aloft, fight off its enemies, and return home.

There are other reasons, of course — many of them. But they all stem from what has been termed the integrity of Boeing products. Soundly and conservatively engineered, honestly built, these products always have done more than has been expected of them. True today, it likewise will be true in peacetime tomorrow . . . if it's "Built by Boeing" it's bound to be good.

DESIGNERS OF THE FLYING FORTRESS • THE STRATOLINER • PAN AMERICAN CLIPPERS **BOEING**

*THE TERMS "FLYING FORTRESS" AND "STRATOLINER" ARE REGISTERED BOEING TRADE-MARKS

"TAMING THE WILD"

THE last frontier of the vast Northlands has been opened. Civilization and Man's ingenuity are spreading their wings to the far reaches of these rugged lands of Canada and Alaska. The Wild is being tamed.

The men and women of Jacobs are very proud of the part their products have played in this pioneering. For a decade, planes powered by Jacobs have been carrying men and supplies into the "Bush Country," helping to open it. The Alcan Highway—that great achievement of modern engineering and human energy—has recently been completed, and Jacobs-powered planes carried in much of the equipment and supplies for its construction.

Today, military needs swallow all aircraft production, and Jacobs' output, multiplied many times, is powering the majority of the Bomber Pilot Trainers of the huge U. S. Army Air Forces' training program and Canada's Commonwealth Air Training Plan. After Victory is won, however, airplanes will make the rich resources of the Northwest available for the civilized progress of the World, and Jacobs Engines, with new efficiency and new economy, will be ready to blaze the way.

JACOBS
AIRCRAFT
Engines

POTTSTOWN • PENNSYLVANIA • U. S. A.

The "SKYMASTER" swoops to conquer ON AEROLS*

"Mission completed", is the terse message flashed to headquarters as this giant troopship makes a safe Aerol landing at an advanced air base.

Called "Skymasters", Douglas C-54 transports have a load carrying capacity equal to a railroad boxcar. Despite their great weight, these aerial leviathans land with remarkable ease because the shock is absorbed by Aerols.

The protection Aerols give on the troopships of today forecasts the safety they will provide on the peacetime transports of tomorrow.

THE CLEVELAND PNEUMATIC TOOL COMPANY
AIRCRAFT DIVISION • • **CLEVELAND, OHIO**

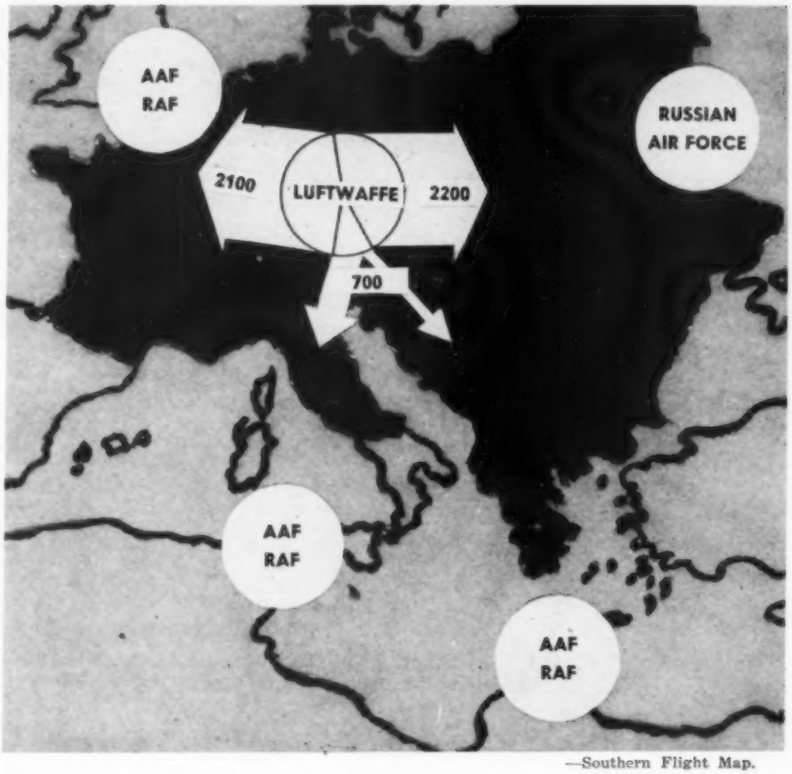
Also Manufacturers of Cleco pneumatic tools for the aircraft and general industry, Cleco sheetholders, Cle-Air shock absorbers for trucks and buses, and Cleveland rock drills for mining and construction work.

AEROLS*

*THE SHOCK ABSORBING UNITS ON AN AIRPLANE'S LANDING GEAR; THE NAME IS DERIVED FROM THE WORDS "AIR" AND "OIL"—THE FLUIDS USED TO DISSIPATE THE LANDING SHOCKS

WHERE IS THE LUFTWAFFE?

The answer can be found in the recent redistribution of the German Air Force to meet growing pressure from the West, East and South. The map at right shows the Luftwaffe's 5,000 first-line combat planes about equally divided between East and West, with smaller allocations to the new Allied front in Italy and threatened point of invasion in the Balkans. As pressure increases against these four points, Germany will have to make new readjustments. Each transfer must be at the expense of the first-line force, for the Luftwaffe's reserve, once equal to 80 per cent of its first-line strength, has dwindled to only 15 per cent, or about 750 planes. Monthly replacement needs have expanded beyond production, and the remaining reserve is expected to be exhausted by January 1, 1944. Meanwhile, Germany's paucity of air strength diminishes rapidly on a comparative basis, for AAF, RAF and Russian offensive air power is not only under expansion but Allied operational bases are moving closer and closer to inner Germany. The Luftwaffe has been effectively outweighed in the balance of air power.



—Southern Flight Map.

DEFENSE MEANS *Defeat* FOR THE LUFTWAFFE

★

By TOM ASHLEY

★

BELEAGUERED by strategic bombardment of its homeland resources and trapped on two ground fronts in the most wasteful employment to which air power can be assigned, Germany in the early fall of 1943 was brought face to face with deciding how to delay complete defeat. Would the Prussians fall back on their characteristic strategy and strike out with last-ditch offensives without regard to costs in men or equipment, or would they reel in their offensive strength ever closer to Berlin and concentrate on the defense? Almost immediately it was plain that for the time being, at least, Germany would retreat into a concentration of defenses, not only on the ground but in the air as well.

In land fighting, opening of the long-awaited Second Front in Italy via Pantelleria, Sicily and Southern Italy revealed that Germany favored retreating into the so-called European "fortress." Air resistance paled all along the way, except for fitful efforts, as at Salerno, to gain time for defensive preparations farther North after the surrender of Italy. On the Russian front the Germans fell back, too, but under different circumstances. Not only was the Russian offensive more massive than amphibious-born Allied pressure in Italy, but it came at a time when the *Luftwaffe* was being readjusted to meet changing European conditions such as the capitulation of the Italians and the imminence of new Allied invasions aimed at the Balkans, the Channel Front and Norway-Denmark. There was ample evidence that the *Luftwaffe* was being strengthened in the West and South at the expense of the Eastern Front. As a result the Red Army rolled onward more successfully than ever, forcing German readjustments on the land front as well as in the air.

While we are concerned more by the air phase of the matter, the situation on the ground has tremendous significance. The land gains from East and South are primarily important because they are shoving Allied and Russian air bases ever closer to the German homeland. Secondarily, they are snaring the *Luftwaffe* in battlefield aviation. Losses in air warfare are heaviest when opposing air support teams clash—larger numbers of

planes are used, they are kept in the air for longer combat hours, the short range of such planes brings their bases under strong air attack, and the planes are subject to intensive ground fire as well as that from opposing planes. The contrast between strategic air power and tactical air strength is sharp—long-range bombing, demanding extremely efficient application, can be and is husbanded; battlefield aviation ebbs and flows with the opposition strength and fundamentally is a fight-or-die-on-the-spot proposition—there are no foxholes in the air.

Luftwaffe Strength Analyzed

Whither shall the German turn? If Goering pulls air strength into inner Germany to protect vital industries, he exposes the *Wermacht's* ground legions to powerful air support accompanying Allied and Russian armies. He must protect the homeland from long-ranging heavy bombers, or see his Messerschmitt, Focke-Wulf, Junkers, Heinkel and other aircraft plants go to pieces beneath night and day bombings. More and more of these factories become exposed as the land front approaches, but if Goering builds up air strength along the land front the fury of battlefield aviation skyrockets his losses. A false move now would be fatal.

It would be more practical, of course, if Goering had 20,000 or more combat planes at his command. Air power is flexible and can be shunted from front to front as the need arises. But the juice in which Goering stews is clouded by the fact that he doesn't have 20,000 or more combat planes at his disposal. His *Luftwaffe* is not only insufficient to meet the growing demands on it but lacks offensive power—its strength is concentrated in fighters and light and medium bombers.

We think Germany has no more than 5,000 planes in its first-line combat force. Our estimate coincides with that of the RAF, whose most ardent patron, Peter G. Masefield of the *Aeroplane,* London *Times* and British Broadcasting Corporation, is more specific and counts only 4,900 in the *Luftwaffe.* Masefield should know, for he practically lives with the RAF's G-2 section. Recently in this country as the guest of General H. H. Arnold, who wanted Masefield to see the AAF in training, the Britisher found himself in Texas (now he has a better appreciation of AAF tactics) and we enjoyed an opportunity of comparing notes with him.

"The RAF isn't underestimating the *Luftwaffe,*" Masefield reported. "They know it has as many first-line aircraft as ever, perhaps a little more and certainly better types."

The *Luftwaffe* has a first-line combat strength of 4,900 aircraft—as much as it possessed five Septembers ago when Poland was invaded, said Masefield. But it is much weaker today in reserve strength. "When Germany began this war, the *Luftwaffe* maintained a reserve equal to about 80 per cent of its first-line combat strength," he explained. "Today that reserve force equals only about 15 per cent of the combat effectives."

Thus the British authority pictures the *Luftwaffe* today as having a reserve force of only 735 airplanes supporting its first-line strength of 4,900 —a total of 5,635, as compared with 9,020, including 4,120 in reserve, in 1939. Analyze those figures and you begin to see the downfall of Germany. Whereas it required four years to whittle the air blitz machine from 9,020 to 5,635, most of that destruction has been done during the last two years. Added to this has been the tremendous pounding at German industries by heavy Allied bombers, particularly that of the AAF's precision squadrons.

The British estimate current German aircraft production at about 2,300 planes monthly. Of these, only about 1,800 are combat types, and in recent months German output has been narrowed down to fighters, with fewer bombers being built. This production has been insufficient to maintain the necessary reserve force of 80 per cent. Increased fighter output is helping some, but not nearly enough, for it is being overwhelmingly offset by constantly-expanding attrition due to increased Allied action and widening battlefield losses.

Bombing Is Defeating Germany

"By January of 1944," says Masefield, "we figure we will have eliminated Goering's last remaining 15 per cent in his reserve strength. From then on Germany will be losing first-line aircraft, and will have no reserve to rely on except the output of German industry." The British, he adds, expect a German surrender by September, 1944.

We pass along Masefield's figures because we think they are the most authoritative available. Certainly they reflect the observations of competent RAF experts. But we are inclined to think Masefield's outlook is too con-

(Continued on page 32)

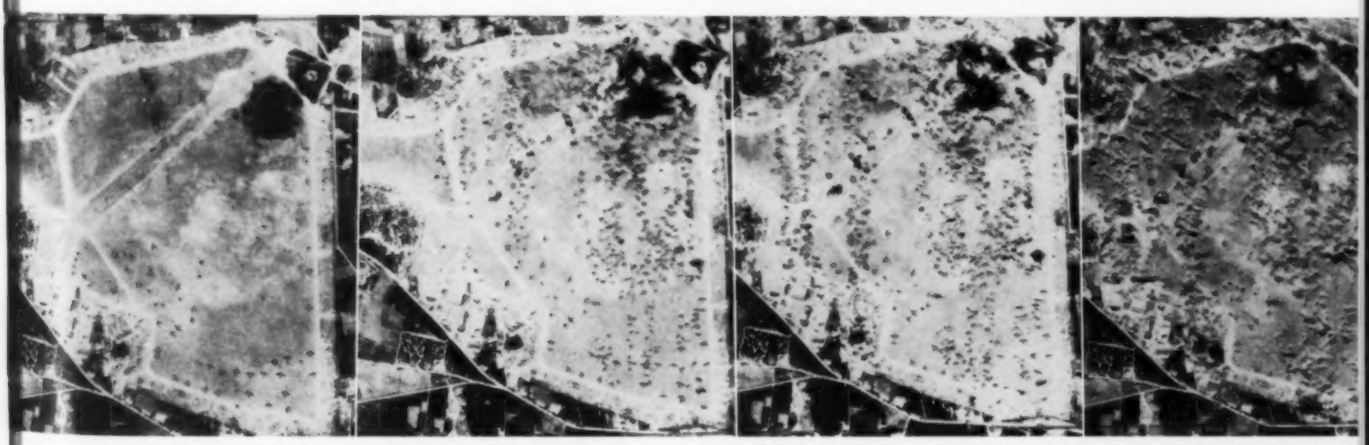
1 Sicily's Milo airdrome contained 122 Axis planes when U S A A F bombers struck it. Four photos show results by stages.

2 Fragmentation bombs begin dropping. Targets are 60 single-engined craft, 29 medium bombers, 33 transports.

3 Bombs now cover over half of airfield. Note fires springing up where bombs strike parked aircraft and buildings.

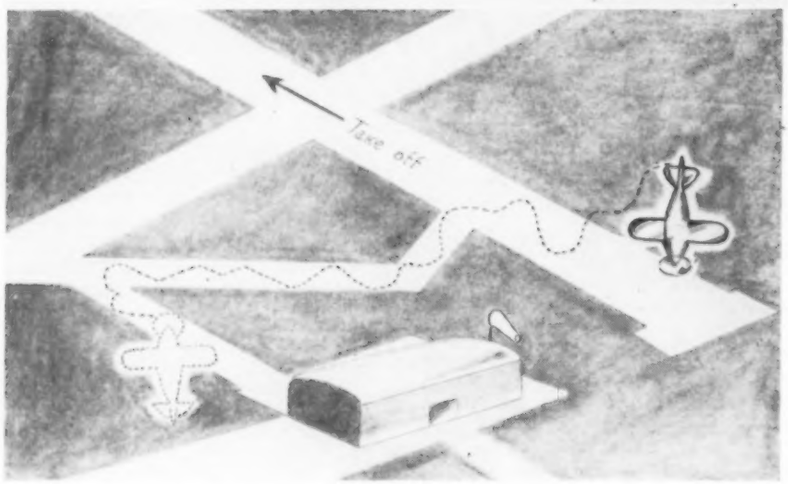
4 Blanketed by bombs, Milo airdrome is badly damaged and over half of its parked airplanes have been destroyed.

—U. S. Army Air Forces Photos.



The SEQUENCE

How to Fly It Properly



Any type of good flying, whether by sequence or otherwise, begins on the ground before take-off. "S" turns while taxiing are a must. Position at end of runway, as illustrated above, is to face incoming traffic at a 45-degree angle. Once in take-off position after revving up and being clear of traffic, don't diddle-daddle—go ahead and take to the air.

By GEORGE R. CLAY

IN this series of articles on the sequence, we wish to clear up many points that might cause doubt in the minds of students and explain, as well as extol, the now famous sequence and series of maneuvers as usually required by CAA General Inspection for private or commercial flight tests.

We realize there will be wide differences of opinion and I only hope to submit here those phases of the sequence having universal application. If you disagree, these columns of SOUTHERN FLIGHT are open to your arguments and the Editor welcomes them.

The flight sequence was created to aid the student and not to make everything hard for him. It was meant to save him money by getting the greatest possible amount of dual or practice flying in every hour flown. It has been established to eliminate every unnecessary minute of flying. It cuts out sightseeing, hunting and pointless wandering about, by grouping over one spot all the work necessary to attain a license, prohibiting the trainee from gadding all over the countryside looking for satisfactory pylons, roads, etc., over which to fly his maneuvers.

When flying the sequence, it is necessary for the Inspector to speak but a few words during the flight for your "ticket" if he prefers to keep silent. The work is diagrammatically outlined and unless you are flying as a robot, and he is in doubt as to your real ability, he will probably confine himself to an absolute minimum of conversation. Your ride with him will be many times easier and more relaxing than it would be with a conscientious instructor who makes every dual period a check ride.

After introducing yourself to the Inspector, you immediately show him your Instructor's recommendation as to your ability to take the check flight. You then submit your log book, so that your cross-country and solo time can be properly checked. Along with your log book you submit your Airmen's Identification Card and your Solo Student permit which was given by the CCA physician. On the back will be the information as to your date of solo and cross-country, proficiency certificate properly signed by your instructor, and the report from Washington with the grades you received on your written test.

With the preliminaries over, you will escort the Inspector to the ship you are to take the ride in. Be sure it is ready to fly and contains the proper papers, that it is full of gas and oil, and "revs" up on either magneto. Be sure to check all these things yourself; in fact, give the plane a good line check. It would be extremely embarrassing to have an eagle-eyed Inspector catch you with some glaring discrepancy just before a check ride. Don't overlook your fire extinguisher and check to see that it is full. Check your first-aid kit and be sure it is complete. Letting the Inspector find these things not done when a dozen more like you are clamoring for attention on a blazing hot day, or a bitterly cold one, is disconcerting, to say the least.

You are now in the ship with the Inspector. We will ride along and take the place of the "Gremlin". You say you are all ready to go and call "contact" to "prop" your ship, but look, there are no chocks in front of your wheels. Suppose the ship does have adequate parking brakes—they fail at times, so be sure and see that chocks are under your wheels. I have seen Inspectors refuse to ride when such precautions are not taken, so don't forget those chocks.

Those exacting details in the sequence of CAA General Inspection maneuvers should be followed properly if you want to live to find greater enjoyment in flying. Their full meaning is explained by a veteran instructor in this article, first in a series.

You are now "propped" and the chocks have been removed, so you start to taxi to our take-off position. Here is another touchy situation: be sure and "S" turn while taxiing. Keep swinging your nose from side to side and under no circumstances make the Inspector crane his neck to find out where you are going.

Most Inspectors respect airplanes more than anything in the world, and it grates on their nerves to see one abused or mishandled in any way. It is extremely uncomfortable to be in a ship with someone else handling the controls and to have it a secret where he is going. The first rule of good flying is never to allow anyone to become uncomfortable. Again this warning—don't force the Inspector to crane his neck or take over the plane. Your entire flying life and its length, will depend on your air courtesy. In the air we who live and grow old never contest a right of way. We learn to detest hospitals.

In taxiing, your speed judgment should be developed so that you are able to control the airplane by the judicious use of rudder and throttle only. The use of the aileron is being frowned upon more and more by competent Instructors. If you slam on the brakes to control the direction of your plane, there's a mark against you before you get into the air. Nothing stamps you more quickly as a sloppy pilot than rough taxiing habits. A good rule to follow when taxiing is never to taxi faster than a man can walk, and we don't mean trot.

You have now reached the extreme end of the runway, the down-wind end. Never allow the Inspector, or anyone else you are trying to impress, see you taking off mid-way or even three-quarters way of the runway. It is impossible to use any part of the runway behind you, and it is a distinct mark of an amateur to use only that part of the runway you think will get you off the ground. The accepted forced-landing procedure in taking off and while at an altitude of less than 400 feet, is that you land straight ahead or, at the most, deviate only enough to miss an immovable object ahead of you.

You have reached the head of the runway, so you park forty-five degrees toward downwind, facing incoming traffic to your right if the airport has the left-hand rule. All traffic then will be visible to you from the base leg on. Another reason you do this is to let incoming traffic know you are not taking off at once, and that you see them. That's a comfortable feeling for the incoming pilot to

(Continued on page 38)

What KIND OF AIRPLANE WILL YOU FLY *Tomorrow?*

By W. T. PIPER

The United States has so fully converted its plants to war production that quick return to the manufacture of civilian goods at the end of the war is imperative. Otherwise, there will be widespread unemployment, since most production workers have not the necessary skill to be of value in tooling up for new projects. For this reason I am convinced we should continue for a time to make our old models. We cannot cripple our output of necessary military goods by having our best men now preparing for postwar products.

There is a lot of talk about the super-duper models which we will have tomorrow; it is my experience that improvements in all things come slowly and I can see no reason for people to expect the Aviation Industry to perform any miracles. What the postwar planes will be like is hard to say, but there are certain things we should look for.

Airplanes are especially adapted to long trips. To be satisfactory, more speed than that of prewar planes is desirable. This means that drag must be lessened. A low-wing plane can be built without struts much more easily than a high-wing one. The low-wing also furnishes a convenient place into which the landing gear may be retracted. But this type of landing gear is heavy, expensive, and hard to maintain, so it is questionable whether a clean, fixed gear is not better for private planes.

Inasmuch as many of our accidents are caused by stalling the plane and subsequent spins, there will doubtless be much stress laid on making the planes spin-proof. This will be especially so after we get away from the military influence and are catering exclusively to civilian flyers. There are some marked advantages in the tricycle landing gear and they are certain to be given a good tryout. Time alone will tell which will be the most popular. With cleaner airplanes, the glide is lengthened and this means that spoilers or flaps—air brakes of some kind—will be required.

I believe that flying can be developed by far into the easiest and lowest-cost form of transportation. The planes of the future will be flown by people with limited incomes and must necessarily be low in first cost and have a small fuel consumption. This means that their engines cannot develop much horsepower. The average man's time is not so valuable that he can afford to burn the extra gas required for speed. I don't look for much more increase in speed than can be obtained by better designs.

Aluminum and magnesium will be plentiful and cheaper in the near future. They will doubtless be used in much larger proportions, as light weight will always be essential. Plastics have been much ballyhooed, but more research must be done before they will be entirely satisfactory. Wood is increasingly hard to get so that its use seems to be limited. The old tube-and-rag construction is light, easily repaired in the field, and is so well suited to limited production that it should be widely used.

Several different bodies can be placed on practically the same auto chassis. So far, this has not proven practical with an airplane—with the result that four- or five-place jobs cost much more than two-place ones. We all would like to have a fast plane with lots of room and ample baggage allowance, but the two-place will be so much cheaper that I expect it to be the most popular. Extra size means extra drag and lessened speed, or increased power. The manufacturer would like to furnish exactly what the buyer wants, but always has to keep cost in mind. Since the output is small, the price of all parts and accessories is high. Planes will have to be exceedingly simple if they are to be sold in satisfactory numbers.

(SOUTHERN FLIGHT has asked leading authorities to express their views on postwar possibilities. Mr. Piper, manufacturer of the familiar Cub, leads off the discussion with this statement.)

DEFENSE MEANS DEFEAT OF LUFTWAFFE

(Continued from page 29)

servative regarding future bombing successes against Germany. For one thing, he and the RAF gauge the progress of the *Luftwaffe's* collapse by British standards—that is, they would like to *believe* the AAF can reduce German industry quickly by precision bombing, but they *know* RAF Area bombing will do it but not overnight. And that is where we think the AAF will surprise the British, for while we *believe* RAF night bombing can eventually cover the German homeland, we feel confident the AAF can do the job in one-fifth the time with one-fifth the bombers, bombs and losses.

The Eighth Air Force based in England has dropped much less tonnage of bombs than the RAF. In fact, it is just now approaching the 20,000-ton mark, and a single raid's total of 1,000 tons is only a recent accomplishment of the Eighth, whereas the RAF has worked its total per raid up to beyond the 2,500-ton mark, and soon should reach 5,000 tons a raid. But effectiveness is not so much how many tons a raid deposits on Germany, but the marksmanship employed and its accurate destruction.

No single German aircraft factory, for example, covers more than fifty acres in floor space. To destroy a fifty-acre building, the RAF would employ "area" bombing tactics requiring 250 night bombers dropping a total of 250 or more tons of high explosives, mostly block-busters exploding on surface contact. The "pathfinder" element may pin-point the building, firing it to mark the spot for following waves, but a great many of those tons would go wide, which is another way of justifying the word "area" in describing RAF tactics. The AAF, going after the same target, would employ only fifty precision bombers droping a total of fifty or more tons of delayed-action bombs, exploding internally after piercing the roof. Most, if not all, of those fifty tons would hit the building.

Reducing these figures, it is to be noted that the RAF requires five tons per acre for its area bombing. Hence, a 1,000-ton raid can be counted on to destroy 200 acres of a city. This means 3,200 tons per square mile. Germany's industrial square mileage, some of it concentrated and much of it dispersed, is tremendous, demanding astronomical figures in RAF tonnage. It would take over 500,000 tons of bombs and many months to apply the rule of Hamburg to the fifty or more key German cities containing strategic industries. On the other hand, the AAF would pin-point the vital spots in those cities, requiring less than 100,000 tons of bombs and one-fifth the months needed by the RAF to perform the same job. Figuring one ton per plane on extended flights, the RAF would employ five times the number of planes and crews the AAF would need. The difference in losses would be tremendous.

Moreover, night bombing does not destroy German fighter defenses as effectively as daylight tactics. During August, 1943, the Eighth AAF operating from British bases shot down a total of 631 German planes. Of these, 541 were bagged by Flying Fortresses. These figures are all the more significant when it is considered that only 500 heavy bombers were dispatched over European targets during that month. Major General Ira Eaker, commanding the Eighth, has said his strength will be more than doubled by the first of the year. We can count on German losses in aerial combat to be doubled also, if not more greatly increased because of improvements to AAF bomber fire power (aircraft cannon larger than 37 mm. and more guns per plane have been forecast by General Arnold). From January 1 to July 1 the Eighth destroyed 1,091 German planes in combat, was credited with 371 probables and damaged 450 others. A six-month total at the rate of August's scoring would be 3,781 Germans shot down by the Eighth AAF alone.

Germany's Fatal Mistake

American damage to German factories has also been mounting. The list of vital industries struck by precision tactics is lengthening. A typical example was the damage inflicted on August 17 when Flying Fortresses struck Regensburg, deep inside Germany, and destroyed, according to official estimate, 31 per cent of Germany's day fighter output by hitting the Messerschmitt factory in that city.

To meet the homeland crisis developed by strategic bombardment springing from England, Germany has drastically reduced bomber production to increase the manufacturing of fighters. It has also transferred fighting squadrons inland from the Russian front and the Balkans. German fighter strength in August is believed to have totalled 3,000 or more, with most of them devoted to defense against England-born raiders. Its 2,000 or so small bombers were being concentrated against Russia and the Italian battleground.

Is Goering patterning his homeland defenses along the lines of British resistance to the *Luftwaffe* in 1940? It certainly appears so. Here is where Goering will make the most costly mistake of his misguided career, for air defense alone did not save England. Just as important as the efficiency of the RAF fighters was the deficiency of the German onslaught. The German air invasion of the British homeland employed battlefield aviation, or tactical air force. Its bombs were inaccurate and too small of calibre, its losses were huge. Germany today faces a far more serious attack. Where low-flying, impotent little Junkers and Messerschmitts loosed 500-pounders on London, Fortresses and Liberators, frequently out of anti-aircraft range, are dropping 2,000-pounders and 4,000-pounders on Berlin and other cities. As new air bases are established closer to Germany, these bomb loads and their frequency will increase.

Germany, in going on the defensive, will learn from bitter experience that *bombers, not fighters, win air superiority*. To defend yourself against heavy bombers you don't shoot them down —you bomb them on their bases and in their factories. Day after day the Eighth AAF proves the meaning of this, but Germany, having never understood the heavy bomber, ignores the point. The *Luftwaffe* based its hopes of world conquest on dive bombers and fighters. Their dive bombers have been defeated time and again until the Germans realize the mistake there. But they still retain faith in their fighters, as demonstrated by recent production readjustments and developments in fighter guns, the latest of which is a rocket-like device. Even larger guns mounted on fighters will not prove effective against American bombers, for the simple reason that larger airplanes carry larger guns in greater quantity than fighters, and the B-17 and B-24 are not nearly as large or as powerfully-gunned as newer models now in production. Now it is too late for Germany to build fighters the size of our super bombers, for they are under heavy attack and have already converted to the smaller sizes. Had they copied the Fortress in 1940, and equipped it with guns instead of bombs, using it as a bomber-destroyer, the story might have been different.

Retreating in the air, as well as on the ground, Germany will learn its fighters are no more effective than its anti-aircraft guns when pitted against strategic bombing. The lesson will be valuable, for it will wield far-reaching influence on postwar planning of America's peacetime defense against aggression. We now outweigh Germany in the balance and range of strategic air power. Let us be sure we always do.

Torpedoes by the Ton... *but controls like a feather*

The planes that fire "battleship busters" are virtually a combination truck and sailplane by reason of their structural ruggedness and fine sensitivity to control.

Air battleship against battle wagon in explosive, buffeting and blazing air battle demands that the plane be built right.

The parts that go into it must be perfection itself!

Here we have our mind's eye on our great responsibility, for Freedom is at stake! Our boys must come back victorious! That's the idea that animates every worker *and* the management of GENERAL AVIATION. Our slogan is "fighting equipment second to none!"

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STRUCTURAL PART | LANDING GEAR PARTS | CONTROL PULLEYS | GUN MOUNTS | GUN CHARGING HANDLE | METALLIC CARTRIDGE LINKS

—Hamilton Standard Photo.

Worldwide Army Air Force maintenance service is typified by this large base at Gura, Eritrea, operated by Douglas Aircraft Company, with B-24's undergoing repairs by Hamilton Standard propeller and other technicians supplied by the aircraft industry. The Air Service Command operates hundreds of such bases.

AIR SERVICE COMMAND "KEEPS 'EM FIGHTING"

IN the early days of World War II, spare parts were not always available to combat Air Force units, and planes were frequently kept out of the fight for want of seemingly insignificant gadgets and mechanisms. Remedial measures, instituted first by improvisation and "cannibalizing" and later by a vast parts pool established by the Air Forces, were expedited. Today the Air Service Command, assigned the task of "keeping 'em flying", claims only about five per cent of Uncle Sam's planes overseas are grounded for lack of spare parts.

It is the Air Service Command, presided over by Major General Walter H. (Tony) Frank, through which our combat Air Forces all over the world get the supplies they need. Bombers and bolts, bombs and bullets, fuel and lubricants, flying suits and jungle kits, radio sets and medical supplies—the supply of all these is the responsibility of the ASC, which handles some 400,000 different kinds of items. Such an inventory, covering parts for 143 different types of airplanes made in the United States, plus maintenance equipment and vehicles, is about ten times the scope of the items offered by America's largest mail-order house, whose catalogue lists some 40,000 different items.

ASC Assigned Seven Missions

But supply is not the only task of the ASC. Its many duties, summarized by the Office of War Information in a survey of the Command released last month, are these: (1) Furnish supplies for all Army Air Forces airplanes throughout the world, (2) repair, overhaul or rebuild these same planes, here and overseas, (3) train the personnel required for supply and maintenance, (4) prepare for shipment all American and Lend-Lease planes going overseas, (5) give final inspection to and make any needed changes or repairs on all American planes flown overseas, (6) make final inspection of Lend-Lease planes consigned to South and Central American countries and furnish supplies, routes and other assistance for the flight from this country to each plane's destination, and (7) handle all air freight in this country flown by the Air Transport Command, its functions being similar to those of a railway express company.

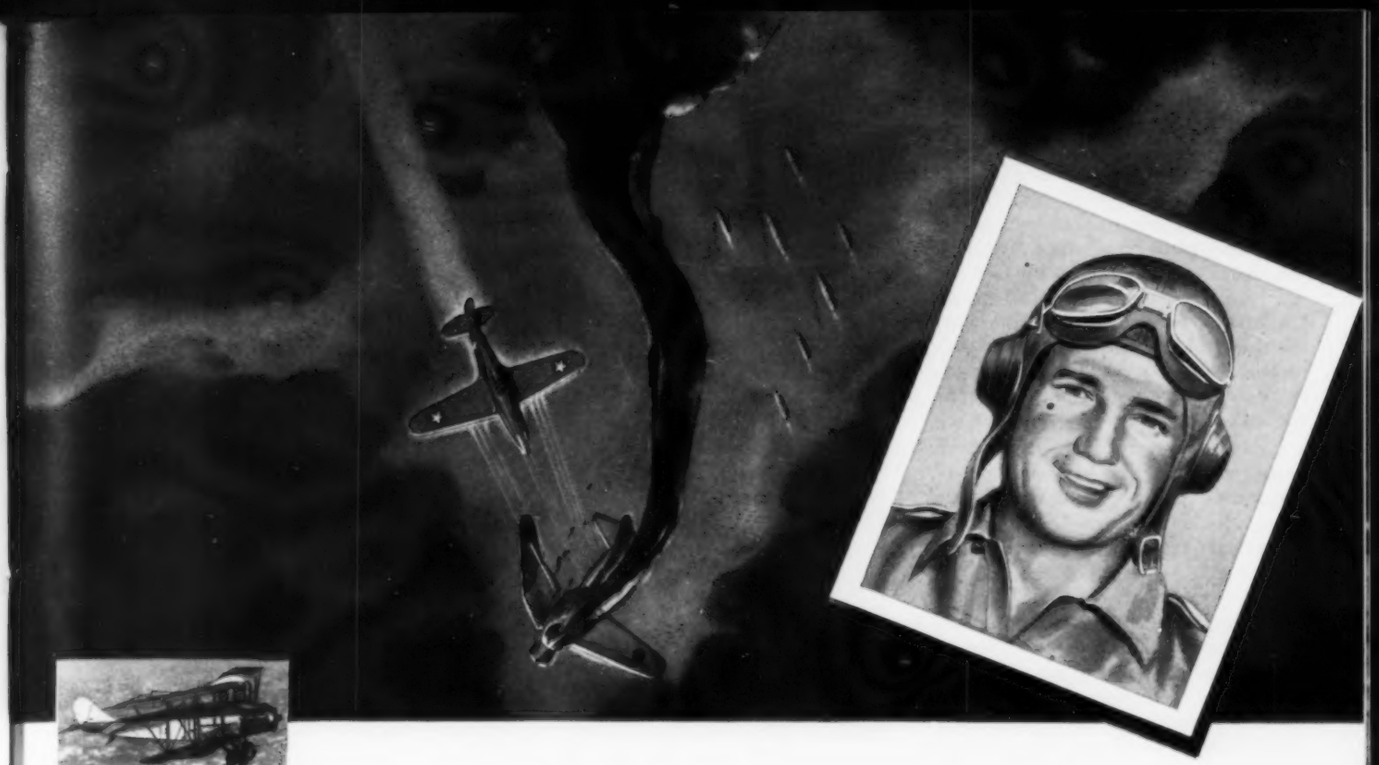
Its personnel figures have not been released in detail, but the ASC carries on its roster "tens of thousands" of officers and enlisted men and 300,000 civilians. They operate eleven main supply and maintenance depots and some 300 subdepots and specialized depots in this country and numerous similar installations in the theatres of operation. In peacetime the Materiel Command performed air servicing, but its vast operations necessitated establishment of a separate Air Service Command on October 17, 1941. Last December a reorganization was effected, replacing the old-type general staff system of administration with an organization patterned along industrial management lines, with three operating divisions and a Control Office. The divisions are Supply, Maintenance, and Personnel-Training. Each division is headed by a general authorized to run his own division as he sees fit and subject only to the ASC's commanding general. The work of the three divisions is co-ordinated by the Control Office. Headquarters are at Patterson Field, Ohio. The main depots are at Fairfield Air Depot, Ohio; Rome, N. Y.; Middletown, Pa.; Mobile, Ala.; Macon, Ga.; San Antonio, Texas; Oklahoma City, Okla.; Ogden, Utah; Sacramento, Calif.; San Bernardino, Calif.; and Spokane, Wash. Each of the ten overseas theatres of operation has its network of ASC depots.

Supply Is Vast Project

"From the minute an AAF plane leaves its factory, it is the job of ASC to keep it in fuel, bullets and bombs

(Continued on page 36)

Without the unfailing efforts of the Air Service Command, our global Army Air Forces couldn't fight for long. Busier and bigger than the world's largest corporation, the ASC's far-flung installations work around the clock furnishing spare parts, bombs, bullets, fuel and thousands of other essentials.



1923

RYAN-STANDARD cabin plane; pioneer passenger airliner.

1925

RYAN M-1, first production monoplane in America.

1934

RYAN S-T metal-fuselaged primary trainer, led trend to low-wing types

1937

RYAN S-C, cabin plane for private-owner use, featured all-metal construction.

1940

RYAN YO-51 "Dragonfly", Army observation plane with unique performance ability.

1941

RYAN PT-22, one of Army's standard primary training plane types.

1942

RYAN PT-25, superbly engineered plastic-bonded plywood trainer.

Yank Boy Gets Jap!

OUR BOY GETS JAP! LOCAL BOY GETS JAP! NEIGHBOR'S BOY GETS JAP!

Large numbers of Ryan planes are in the war. But close to the hearts of the men who build them, are the Ryan trained *flyers*—thousands of them—now doing such a magnificent job on all fronts.

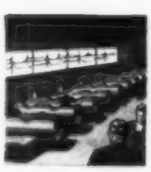
Over Tokyo with Doolittle were *four* alumni of Ryan flying schools. From Europe, from Africa, from the South Pacific now come letters from Ryan graduates—fighting flyers whose appreciation of the Ryan schools' creed of "Thoroughness," is its highest tribute.

Ryan Aeronautical Company is the only major aircraft manufacturer which also, through its subsidiaries the Ryan Schools, operates hundreds of airplanes in daily service. In peace, as in war, such extensive first hand operational knowledge has enabled Ryan to design and build unique *flying experience* into a twenty-year succession of performance-proven aircraft.

Although now 100% devoted to the all-important assignment of training U.S. Army pilots, the Ryan Schools look forward to again including civilian training following Victory. If you or any member of your family expects to play a part in the future of aviation, write today for the interesting new booklet, "So Your Boy Wants to Fly." *RYAN SCHOOL OF AERONAUTICS, San Diego, Calif. Operating bases: Hemet, Calif., Tucson, Ariz.*

RYAN

Rely on Ryan to Build Well

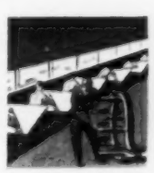


RYAN BUILDS WELL

Ryan construction, proven in aviation's pioneer days, now proven in war, will tomorrow produce safer, more useful peacetime aircraft.

RYAN TRAINS WELL

Ryan School of Aeronautics, famous peacetime air school, now training fine U.S. Army pilots, follows one creed: **Thoroughness.**



RYAN PLANS WELL

Modern engineering + **flying experience.** Typical result: Ryan exhaust manifold systems are now used on the finest planes of other manufacturers.

GENERAL OFFICES: LINDBERGH FIELD, SAN DIEGO, CALIFORNIA

AIR SERVICE COMMAND

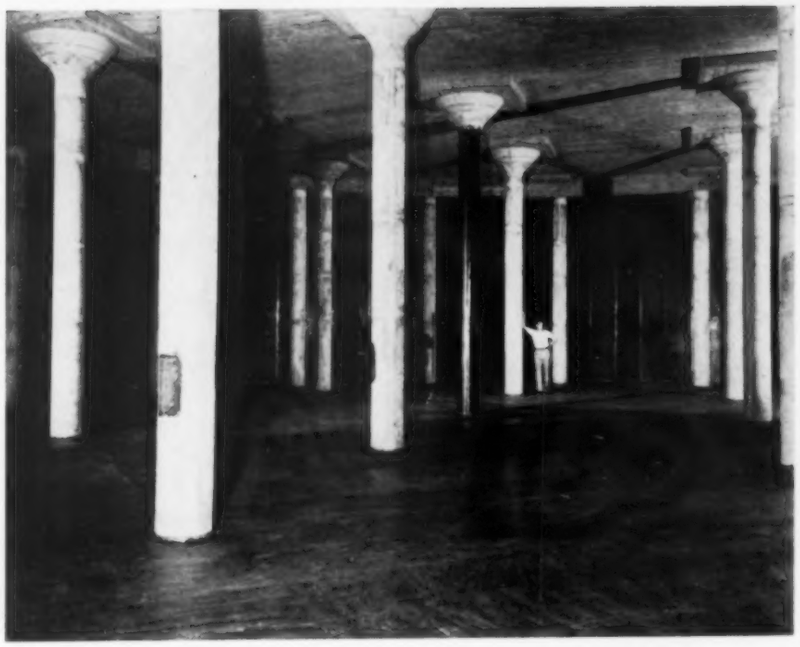
(Continued from page 34)

and repair," said Col. James F. Early, acting chief of the ASC Supply Division. "The measure of our job is how many planes we keep flying." At the start of the final phase of the Tunisian campaign only nineteen of the AAF planes were kept out of combat for lack of spare parts. ASC's present overseas record is approximately five per cent of our planes grounded for lack of spares.

Orders for spare parts from AAF units, wherever they may be operating, must be filled within twenty-four hours of their receipt—by direction of General Frank. Some fighter squadrons, needing two complete sets of certain equipment, wired Patterson Field from the Aleutians during the Attu campaign. The parts arrived at Attu ahead of the fighter squadrons for which they were needed, flown there in twenty-one ATC planes after the equipment was hurriedly picked up at the Fairfield and Rome Depots. Some special plane equipment was needed in the middle of the Sicilian campaign. An officer left Sicily on Friday, arrived at Patterson Field on Sunday and placed his order, spent a day in Washington in consultation, and was back in Sicily with the parts the following weekend. The Rome Depot recently received an order at 6 p. m. for 300 carburetor parts, needed by midnight. The parts were not in stock, but a crew of twenty-three men disassembled 300 carburetors and at 11:30 p. m., half an hour ahead of the deadline, the 300 parts were aboard a plane and on their way half way around the world.

Filling the longest supply line in the world sometimes results in getting too much at some places. So the ASC's Supply Division must get the right part to the right place at the right time. Because air warfare's rapid pace also results in obsolescence for some equipment, the ASC has also to make the most profitable use of surplus and obsolete parts. For this it operates a depot at Memphis, Tenn., as a clearing house. Whenever possible, excess parts are returned to aircraft factories for incorporation in new planes and offered to other military branches or government agencies.

Hundreds of warehouses here and abroad are operated by the ASC. The 400,000 different items are classified in some thirty categories, and warehoused accordingly. One warehouse or section may contain only airplane engines, another wings, another propellers, etc. Some items, such as aviators' clothing, are stored under varying temperatures. To protect clothing from moths, the warehouse temperature one day is seventy degrees, the next eighteen degrees and the remaining five days it averages about forty. Each of the 400,000 items is stored according to a Technical Order issued by ASC. Uniformity is maintained throughout the depots, so that when a person is trained for work in one warehouse he is able to perform the same work in any other depot, here or abroad.



—Thiokol Corporation Photo.

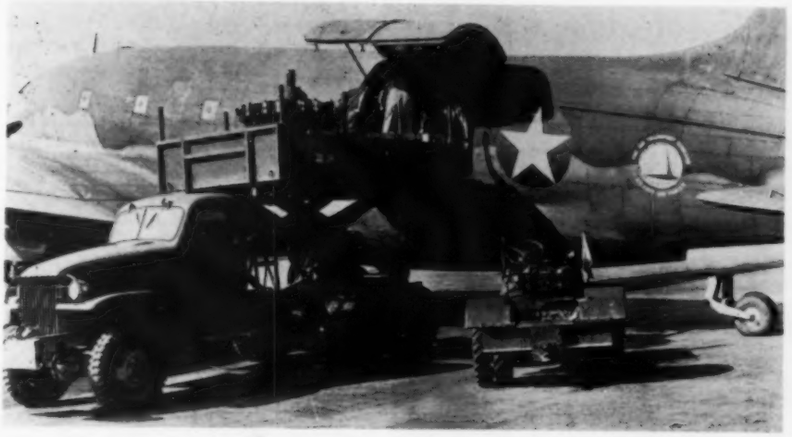
THIOKOL SYNTHETIC RUBBER, lining underground concrete tanks, has solved the steel plate shortage at foreign fuel depots serving U. S. warplanes. Navy experiments led to the development after aviation gasoline and light oils seeped through or were contaminated by concrete until Thiokol lining was perfected.

Maintenance Keeps 'Em Fighting

Without the services of the ASC's Maintenance Division, a plane could operate only so long as nothing serious went wrong with it. "In combat," says Major General Clements McMullen, chief of the Maintenance Division, "that wouldn't be very long." He described his branch as being the "garage mechanics of the AAF", assigned the specific job of keeping AAF planes in combat condition. The Boeing Flying Fortress, *Memphis Belle*, is cited as an example of the ASC's timely and thorough maintenance work. Although badly shot up in twenty-five combat missions over Europe, it looks almost as good as a new B-17. ASC men installed nine new engines, a new wing, and a new tail assembly on the *Belle*, to say nothing of numerous lesser patches such as bullet and flak holes.

The size of the maintenance job on AAF planes is indicated by the personnel requirements for each airplane. For each heavy bomber, the ASC provides ten maintenance men in one of its main depots and five in a subdepot. For other type planes, the maintenance personnel averages out statistically as follows: Four-engined transport, eight men in main depot, 4.5 in subdepot; medium bomber or twin-engined fighter, six persons in main depot, four in subdepot; twin-engined medium and heavy transport or light bomber, four persons in main depot and 3.5 in subdepot; single-engined fighter or bomber, three persons in main depot and three in subdepot; twin-engined light transport, one person in main depot and 2.5 in subdepot; twin-engined advance trainer, 0.8 person in main depot and two in subdepot; glider or single-engined basic or advanced trainer, 0.5 in main depot and one in subdepot.

The nature of AAF repairs and maintenance is classified by "echelons." First and second echelon work consists of refueling, routine checking and making minor repairs that can be done by a plane's own crew or by a ground crew with the use of hand tools. All other maintenance—called third and fourth echelon work—falls under the ASC's Maintenance Division's jurisdiction. In addition, the Division provides crews to do first and second echelon work at times—as after the Ploesti raid, when the B-24 crews, including mechanics, were fatigued from the



—Air Forces Photo.

SPECIAL LIFT TRUCKS FOR AIR CARGO and other special devices have been developed by the Air Service Command in its global operations, which include operations of the 39th Air Freight Wing, a military version of domestic air express service. The Air Transport Command flies the freight, but the ASC loads and unloads it at hundreds of stations.

fourteen-hour-long operation. ASC mechanics checked and refueled those planes for the next mission, while AAF crews rested.

The ASC Maintenance Division not only repairs damaged planes. It makes improvements on new planes by "modification". Moreover, it also strives to prevent the necessity of repairs, chiefly by furnishing each AAF airplane with detailed instructions for proper operation. Many of these instructions originate in the combat areas, where pilots submit "unsatisfactory reports" and other comment covering operational and maintenance difficulties. A staff of experts studies these reports, and corrective measures are quickly taken. ASC modification work can be illustrated by the B-24's new nose turret. At a South Pacific base, the ASC experimented by replacing a Liberator's two flexible nose guns with a powered turret. It covered up weaknesses of the flexible guns and its success against Japs attacking head-on was so effective that now all B-24's are being modified by the ASC for the installation of powered nose turrets.

Wrecker trucks and mobile shops are used by "service squadrons" in the zone of operations. They locate planes forced down and move them to the nearest point from which they can be repaired and flown off again. More complicated repairs and maintenance are performed at air depot groups, which are equipped to rebuild planes, tear down and reassemble engines, manufacture emergency parts and do other types of intricate work. Wherever possible the assembly line method is employed, particularly at engine overhaul shops.

Ideal situations do not always prevail. While the Oklahoma City Air Depot is air-conditioned and kept spic and span, ASC crews in the Aleutians work in bitter, wet cold, on the bare ground, often without shelter or adequate parts and tools. Recently a B-24 returned from Kiska with an engine frozen stiff. Parts weren't available in the nearest supply. But crews "cannibalized" an engine from a wrecked B-24, weather-beaten though it was by two months' exposure to storms and abrasive volcanic dust. A 45-knot gale, accompanied by sleet and snow, turned over tarpaulin shelter stands until a tractor and a jeep were lashed to them. But despite all this, the crew, which began the job at 1:30 p. m., worked throughout the night and by 10:30 a. m. the plane was test-hopped and that afternoon flew on a combat mission. At another Aleutian base, an eight-man crew, including a civilian, worked all night by flashlight and jeep light, without shelter from a thirty-five-knot gale, to remove hundreds of small screws and salvage from a wrecked B-24 enough parts to repair another Liberator which landed from combat with the leading edge of a main wing spar shot up, a damaged de-icer boot and other wounds. But within ten hours it was again combat worthy, ready to deal with the Japs at the 5 a. m take-off.

300,000 Civilians in Service

The Personnel and Training Division of the ASC has its many problems. Personnel procurement, as far as its officers and men are concerned, has not been unduly difficult, since Selective Service and the War Department have supplied them. But the ASC employs 300,000 civilians, and they come from the Civil Service Commission. The complicating factor is wages, for government wages for civilian technicians are generally lower than those offered by industry. Moreover, the difficulty doesn't end once the workers are hired. An ASC officer complained that after he trained his workers, many of them quit and went to work for a certain aircraft company. Money talks. The thousands of civilians who stick with ASC, even though they are capable of earning more money on the outside, are the key to the ASC's efficiency, says Brig. Gen. E. E. Adler, chief of personnel and training.

Civilian workers and military members are trained separately, each with different methods and for different purposes. The civilians, 40 per cent of whom are females, are trained in ASC schools resembling vocational institutions, except that equipment is generally superior and each trainee is trained thoroughly for one particular job. The course is from six weeks to three months, depending on the difficulty of the trades. Civilian employees are trained for work in this country.

Military "Air Express" in Operation

More comprehensive training is given enlisted men, since they will work under more difficult conditions overseas. Most soldiers assigned to ASC come from the Army's various technical schools. The ASC forms them into units and gives them unit training in three phases, each requiring two months. During the first phase, soldiers are formed into squadrons and given basic military training for overseas service. The second phase brings together the individuals and small detachments, perfecting group operations. In the third and final phase, the groups move to another location and join an AAF combat unit and, with the pilots and others with whom they will serve during combat, the soldier-mechanics do the same work they will do once overseas.

The Air Service Command has a hand in all three methods (fly-delivery, stripped-down shipment or crate shipment) of transferring AAF and Lend-Lease planes overseas. Not all planes can be flown across, especially fighters, although some, such as P-38's, have been ferried by using belly tanks for extra fuel. AAF commanders prefer to receive fighters, if they can't be flown over, in a stripped-down condition rather than in crates. But stripping fighters for shipment is a complicated job, consisting of over seventy individual operations and requiring about 100 man-hours per

(Continued on page 54)

Most farsighted airport plan yet developed for the Southwest is this Oklahoma City project, to cost $25,000,000. A. D. Engle, Austin Company engineer, is shown pointing to U-shaped parking apron inside which are many novel facilities, including railway and motor truck loading docks adjacent to airplane cargo ramps.

OKLAHOMA CITY PLANS $25,000,000 SUPER AIRPORT

Preliminary plans for a $25,000,000 airport and seaplane base at Oklahoma City to provide postwar facilities for 150-ton passenger and freight planes, civilian planes and helicopters have been announced by the Oklahoma City Chamber of Commerce. The huge airport, so designed to co-ordinate highway, rail and air traffic, will cover six miles and is intended as a mid-way stop for transcontinental air traffic. The seaplane base, adjacent to the airport on a three-mile-long creek reservoir, is to serve as a link between inter-American and trans-oceanic traffic.

Two 11,000-foot runways, 500 feet wide, will serve the large passenger and freight planes and glider-tow trains, while four other runways will be provided for commercial planes, according to the plans of the Austin Company, designers of the program.

A civilian airport with hangars, a landing field for civilian helicopters and helicopter "feeder" lines, and a 100-room hotel and administration building with control tower are special features to be built after the terminal goes into operation.

The airport will be connected with rail, truck and bus lines, entering the terminal grounds on a level below the apron devoted to loading cargo planes. A long freight building with gravity ramps and power lifts will make direct transfer of mail and freight between land and air-borne transports.

Complete service shops are to be provided in a second building across from the freight terminal. Private motorists, motor buses and interurban transit lines, paralleling the rail and truck traffic arteries, will have direct access to the passenger terminal, and shuttle bus service will be maintained between the hotel and airliners.

The airport, which is to be financed by private and city funds, has been so planned that sections can be constructed as the need arises.

THE SEQUENCE

(Continued from page 31)

have. By some alchemy, the mental processes of some pilots make them believe they are the only new pilots on the airport. The big chance is, however, the incoming pilot is not far from your own stage of aeronautical development and is as nervous as you would be, wondering what the plane on the side of the runway is going to do. Anything you can do to guarantee your own safety and that of others is good flying and should be observed even around the smaller "cow pasture" airports.

You are now ready to check your magnetos. This standard procedure is accomplished as follows: check oil pressure, and in small engines under ninety horse power if it reads forty pounds we are ready to take off. Then smoothly advance the throttle, keeping your brakes on and "rev" the engine up to 1,500 r.p.m.'s. Then turn your switch handle to the farthest "mag" and read your tachometer dial. If it does not fluctuate over 100 r.p.m.'s it is considered O. K. Then switch back to both and allow the engine to regain normal speed again and switch to the opposite "mag," looking for the same r.p.m. loss, then switch back to both. Assured that your "mags" are O. K., smoothly but rapidly ease off your throttle and check the idling speed of the engine. Regulations say the idling speed must have a minimum of 550 r.p.m.'s and a maximum of 750. If your idling jet is set properly, you then again advance your throttle all the way open and check the maximum r.p.m.'s on the ground. It's a good idea to check with your mechanic as to the maximum r.p.m.'s you should be able to get out of your engine on the ground of every airplane you fly.

The Art of Taking Off

You have now checked your engine and feel pretty good. You aren't nervous and haven't forgotten a thing, so you glance up and to your right to clear traffic. Should a plane be on the last part of its base leg, you won't take off since you do not have a radio or traffic control. If the plane is making a large approach and common sense tells us he is still a good way out, swing onto the runway into the wind and without further ado immediately take off. For Heaven's sake don't start fiddling around at this point. When you swing onto the runway, you have cleared your traffic for an immediate take-off. We have seen too many pilots wiggle around and get themselves all set, even to locking their windows after they had swung into take-off position. Danny Fowlie is good at the "Piggy Back" business, but you are not. Ease on that throttle and take off.

We now come to another highly controversial subject: the art of taking off.

Here is the one inflexible rule: When making the take-off run, if you bounce you know your tail is too high. The practice of sticking your nose way down, with the propeller barely riding above the ground, is bad, and it is especially bad on a rough field—and any field is rough which is not smoothly paved.

We advocate allowing the ship to run until the tail comes up with little or no effort. As it rises, you feel the pressure on the stick which you can immediately discern by gently working against that pressure. You

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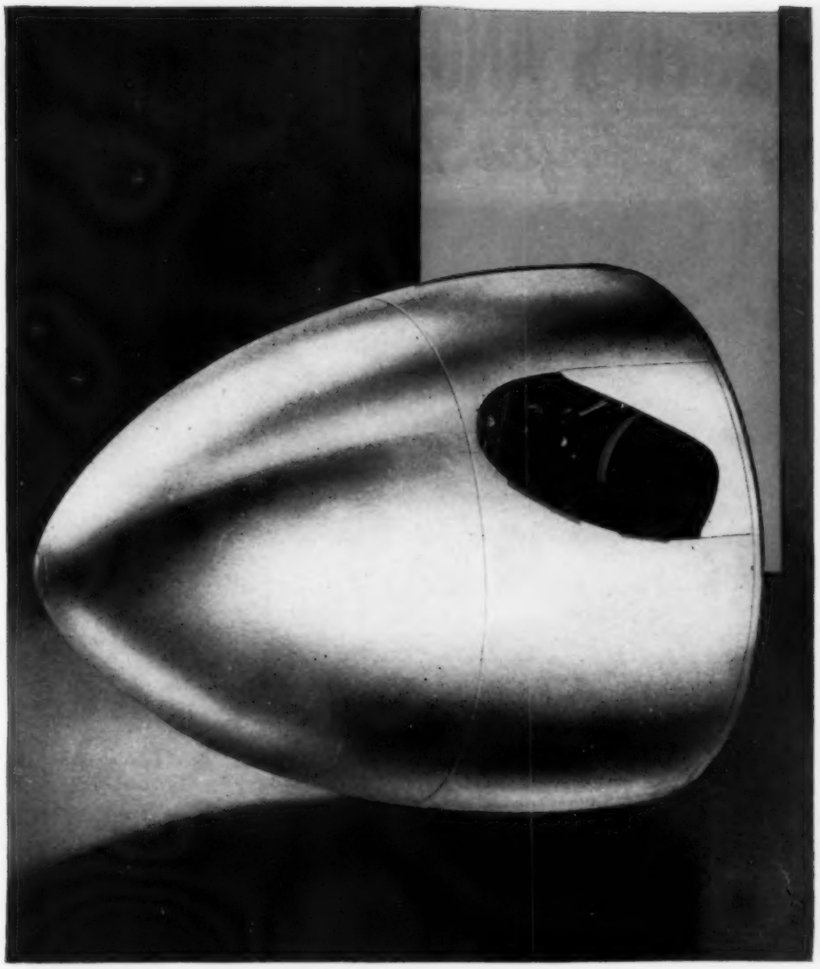


HEADQUARTERS FOR PROPELLER SPINNERS

Air Associates maintains a separate division, with full production facilities, for the design and manufacture of propeller spinners in all sizes. These range from small nose spinners . . . that enclose the pitch-changing mechanism in the hub . . . to large extended-contour models that enclose the entire hub and inner blade shanks, and provide a streamlined form from spinner tip to engine housing . . . Built-in anti-icer slinger rings and fluid tubes furnished when specified. All spinners are dynamically balanced . . . *The quality of design and workmanship of Air Associates propeller spinners has been proved by their service records on thousands of military aircraft.* Inquiries are invited.

AIR ASSOCIATES, INC.

TETERBORO, N. J. . . . *BRANCHES:* CHICAGO, DALLAS, LOS ANGELES . . . ENGINEERS & MANUFACTURERS OF AIRCRAFT SPECIALTIES . . . SUPPLIERS OF ALL TYPES OF MATERIALS TO THE INDUSTRY SINCE 1927

TESTING ANOTHER TEXAS-MADE TRAINER

. . . for Army Air Force Pilots

The Take off . . . the Finish . . . and a Handshake from President John Kennedy for Test Pilot Yarbrough.

GLOBE AIRCRAFT CORPORATION

FORT WORTH, TEXAS

Manufacturers of the AT-10 Advanced Trainer and the Swift GC-1

THE Sky's the Limit

BY BILL GREEN

Renegotiation should fit individual cases . . . Quickie pilots in trouble . . . 1,000 hours don't always make a flyer . . . Plane vs. Auto vs. Train — we've tried all three . . . Postwar talk.

Renegotiation

WE believe, as every other loyal American should believe, that no person should be permitted to profiteer—that is, benefit abnormally or unduly from their participation in the war effort. During the last war, there were a good many people, including some manufacturers, who sold war goods of inferior quality for too much money. During the last war there were no such excess profit taxes as there are at the present time.

In order to frustrate all would-be profiteers during this war, a little clause was written into all Army and Navy contracts which calls for an audit on the part of either the Army or Navy, or both, to determine whether the manufacturer or supplier, as the case might be, had made too much money off the transaction. The catch comes in the decision of what is too much money.

Up until the New Deal went through its wild orgy of spending and consequent taxation, the average earnings of some companies with which we are familiar ran around 20 per cent of the gross business per year. After all manner of taxes, the average profit was something over 10 per cent per year. As taxes increased, although the average gross profit might have remained the same due to the constantly increasing taxes, the actual net profit which the manufacturer got to keep, became less and less, percentage-wise. As a matter of fact, most companies, after all deductions, were glad to average 6 to 8 per cent on the gross volume of business as their net profit for the year's work.

Now, in order to increase the net profit, all any man or business had to do was to effect some percentage of improved efficiency within the plant. For example, if he could put out a few more products with the same overhead and the same payroll, then his percentage of profits could be increased. If he could effect a savings in his telephone bills, his floor sweep, his electric light bill, his heating bill, or any other of the normal expense items, that money then would be on the profit side of the ledger, thus increasing his percentage of profits.

The Army Audit Section, Department of Renegotiation, has applied to war contracts in the Mid-Continent Area, in some instances with which we are familiar, a maximum percentage of profits, before taxes, of 12.5 per cent. This represents a reduction from previous profits of some companies of 7.5 per cent.

In several cases with which we are familiar, after the deduction of Federal Income Taxes, etc., the profit remaining was 3.3 per cent. The Audit Section expressed great satisfaction in this figure, saying it, undoubtedly, was very fair to all concerned. Thus, if the amount of money that a company may take in in a year, with certain payroll and certain equipment, is usually fairly definitely fixed, then the amount of money that can remain as profit is definitely fixed at 3.3 per cent of that gross income. That means that it makes no difference then what savings may be effected, or what efficiency may be gained, there is no advantage resulting to the operators of the business.

We have the feeling that first, 3.3 per cent is not only far from being a profiteer's profit but it is less than half the normal peacetime profit that most companies can expect. People can put their money in many kinds of enterprises, in savings and loans, etc., and get more than 3.3 per cent return on it without doing any work. For people who own their own companies and who work at them continuously for 3.3 per cent there is little or no stimulus to continue operations or to expand.

We believe that the renegotiation law should be changed to provide fair profits and a fair consideration of the history and aspirations of each individual company as its case comes up. In view of the fact that no improvement in conditions can be made by the company itself by increasing efficiency, it is quite likely that the renegotiation clause actually increases the cost of many items to the government without affecting in any way the profits to the operator.

The most serious aspects to this renegotiation business are found in the fact that a company is not permitted to make enough money to put away for that rainy day which always comes. The renegotiators told some people we know that they would have to depend upon the government for financial assistance when, as, and if it should be required. However, the processes of obtaining government assistance are so difficult and so drawn-out, that it is quite likely many businesses will come to an untimely end without having received such benefits. Therefore, the renegotiation law as presently operated undoubtedly will result in killing off some innocent businesses which should be preserved.

Another bad aspect to the whole thing is that where efficiency has no advantage, it is quite likely that a lot of companies will become relatively inefficient and when their contracts are cancelled at the end of the war, they will not be efficient enough to survive. Efficiency is something that has to be carefully nurtured and it may get away from you at any time.

We think that every effort should be made to urge Congress at this time to modify the existing renegotiation act at least to the extent of permitting companies to maintain a reasonable reserve and to make as much money as people could make by investing a like amount in bonds, savings and loans, etc., plus paying a little premium for their rent and effort.

We Are the Old-Timers

A few days ago, we were listening to some Army pilots heatedly engaged in a conversation about the merits of different airplanes. These chaps were veterans of about two years in the

(Continued on page 44)

Magnesium Makes the Grade

Precious magnesium, lifted from the sea in increasing quantity, has become abundant. That and other revelations concerning the wonder metal have been made by the Dow Chemical Company, which also reports on results of numerous experiments and applications of magnesium in aircraft construction.

MAGNESIUM, the wonder metal, is now relatively abundant. It is being used more and more extensively in aircraft structures, especially in England, where about 100 planes of a certain type were built in 1939 with their rear fuselages of monocoque magnesium design. Magnesium castings, forgings and extrusions have been practically 100 per cent satisfactory, while satisfactory applications of magnesium sheet have been made for oil tanks, wheel fairing, instrument panels, turret parts, miscellaneous cases and the like. Incendiary bullets do not ignite magnesium, there is less "tuliping" about bullet-punctured magnesium than with aluminum, but explosive shells are more destructive to magnesium structures than to aluminum structures.

These revelations were made by J. C. Mathes of the Dow Chemical Company in a paper on experience with the use of magnesium in aircraft delivered during the National Aircraft Production Meeting of the Society of Automotive Engineers at Los Angeles, September 30-October 2. Among "specific answers to specific questions" given by Mr. Mathes were the following:

Availability of Magnesium

Question: Is the supply of magnesium now adequate?

Answer: There is now an abundance of magnesium ingot. New fabricating facilities for magnesium alloys should be completed shortly after January, 1944, that should at least triple the amount of sheet available and should increase the availability of extrusions in all forms by from five to ten times. Die casting capacity is being expanded and there should be no shortage here. There seems to be adequate sand casting facilities except for a few of the very intricate and large engine and wheel castings, and this condition is also being corrected.

Applications of Magnesium

Question: How far has the development of magnesium primary structures developed?

Answer: Several structures have been designed, built and satisfactorily tested both statically and in vibration. In all cases a substantial weight savings was accomplished, particularly in control surfaces where appreciable weight is saved in balance weight. Only a few of these structures have reached the flying stage, but those have been satisfactory so far. The longest service to date is a pair of wings in service over a year and a half and having about 500 hours of flying time. The British are using magnesium sheet as covering for control surfaces and over portions of the wing on some planes. They also have one model, of which about 100 were built in 1939, having the rear fuselage of monocoque magnesium design. A new model also incorporates a similar design.

The following tabulation gives the weight comparison of some of the magnesium structures which have passed static and vibration tests:

Type of Plane	Part	Wt.	Pct. Saving Compared to Present Construction
Advanced Trainer	Outer Wing	153.5	11%
Advanced Trainer	Aileron	16.0	26%
Advanced Trainer	Flaps	5.6	11%
Pursuit	Stabilizer	34.0	24%
Pursuit	Elevators	22.7	19%
Pursuit	Tail Assembly*	118.1	13%

*Incorporates heavier gauge than conventional to reduce number of internal stiffeners.

Service Experience

Question: How have magnesium parts stood up in service?

Answer: Castings, forgings and extrusions have been practically 100 per cent satisfactory. There are several million pounds per month of sand castings being used in engines, wheels, and airframes, and rarely any service troubles are heard from these. Although not used extensively, forgings and extrusions have apparently given equally as good service. The case of sheet is somewhat different and practically all instances where magnesium has not done the job expected have been applications utilizing sheet. Many, of course, have been satisfactory and sheet is widely used for oil tanks, wheel fairing, instrument panels, turret parts, miscellaneous cases, etc.

Most of the failures have occurred on so-called non-stressed parts, using thin gauges which, in many cases, have been substituted for the stronger aluminum alloy on a gauge-for-gauge basis. Such parts, while not primarily stressed, are subjected in many cases to considerable vibration and abuse. Thin magnesum sheet, perhaps due to its lower ductility and greater notch sensitivity, does not seem to stand this service as satisfactorily. Many of these failures have occurred at points of attachment and in some cases, the trouble was overcome by proper edge reinforcement and the use of doublers. It is apparently the current practice, on aluminum, to reinforce large, flat panels with stiffeners which do not necessarily tie into the main frame. Doors and panels have not worked out and failure has occurred by cracking at the ends of the stiffeners where the vibration is concentrated. Similarly, hinges or fittings which have been attached to sheet and not reinforced at such points by doublers have often failed by cracking. Flooring is another example where conventional aluminum design has not always been satisfactory for thin magnesium sheet. Here the local overloading and impact have sometimes caused premature failure.

Our observation has indicated a satisfactory service experience in both British and German machines for such parts as fairing, cowlings, doors, seats, control surfaces and fuel tanks. In all cases, sheet corresponding to Dowmetal M was used, although the minimum gauges were somewhat greater than usual American practice. Very few cases were observed where sheet thinner than .040 was used.

Effect of Gunfire

Question: What would be the effect of gunfire on a magnesium structure?

CAP RULES 15 Sep 43 PERSONNEL 19

19 Appointments

0. Appointments of officers and non-commissioned officers will be by reason of rating (17), functional assignment (18-1), or operations assignment (18-5).

1. Appointments in grades of SECOND LIEUTENANT and above will be issued by the National Commander on recommendation through channels on CAP Form 19. Temporary appointments of SECOND LIEUTENANTS for operations assignments may be issued by Wing Commanders as set forth in instructions governing such operations. Appointments of WARRANT OFFICERS by reason of rating will be issued by National Headquarters on recommendation on Form 19; by reason of functional assignment, by Wing Commanders, on letter of recommendation from unit commanders. Appointment of non-commissioned officers in the grades of MASTER SERGEANT, FIRST SERGEANT, TECHNICAL SERGEANT, STAFF SERGEANT, SERGEANT, CORPORAL and FIRST CLASS PRIVATE will be by the commanders of Squadrons and Detached Flights. Members with no appointment will serve in the grade of PRIVATE.

2. No member will wear insignia of grade without a currently valid appointment in that grade, signed and dated by the officer authorized to make such appointment, as follows:

1 By reason of rating: "(Full name) is hereby appointed and will serve in not less than the Grade of.....in Civil Air Patrol by reason of having completed the requirements for Rating.....as prescribed by CAP Rules." Such appointments will be valid for the duration of the war plus 6 months unless earlier revoked.

2 By reason of functional assignment: "(Full name) is hereby appointed in the Grade of.....in Civil Air Patrol, by reason of his assignment as (functional title, 18-1) in (name of CAP unit). This appointment terminates on relief from this assignment."

3 By reason of operations assignment: "(Full name) is hereby appointed temporarily in the Grade of Second Lieutenant in Civil Air Patrol for the performance of a CAP assignment. This appointment will terminate 30 days after relief from duty from the assignment." Particulars as to nature of assignment should be inserted after first sentence.

3. Appointment by rating will determine the minimum grade in which a member will serve. Appointment by function will determine the maximum grade. (Example: A member with rating as WARRANT OFFICER will serve in that capacity if unassigned or if assigned as Section Leader or Assistant Flight Leader. But if appointed as a Flight Leader or higher he may serve in the grade prescribed in 18-1.) Appointments may be made in grades less than those prescribed in 18-1 and promotions later made, up to authorized grade on satisfactory service. An officer may serve concurrently in two or more command or staff assignments. Appointment in grade will be for the highest of such assignments.

Subject: Officer Appointments
To: Unit Commanders and Adjutants

1. Title 18 of the CAP Rules provides more definite standards than have been in effect up to now for the appointment of CAP officers, but will not be retroactive as to officers now serving in Wing units. It is not intended that demotions or removals of present staff officers be undertaken to conform to this Title. Conformity may be reached by normal turnover in due course. However, no new appointments will be issued by National Headquarters except pursuant to the manning tables (18-2). Note that a new recommendation blank (CAP Form 19) has been issued.

2. The new Rules simplify the nomenclature as to titles used in designating Staff Officers. The term Personnel and Medical Officers, for example, has been simplified to Medical Officer since the personnel function in most CAP units is handled by the Adjutant. The designation of Training and Operations Officer has been shortened to Training Officer since the average CAP unit conducts most of its operations for purposes of training while such active missions as it may perform as a unit usually will be conducted by the Commander or Executive Officer. No new appointments will be issued for functional titles other than as in 18-1. The term Warrant Officer will be used instead of Flight Officer to avoid confusion with the title of Flight Leader; also because many in the grade of Flight Officer are not flyers.

3. When a larger number of titles were available, many units thought that they should develop full staffs with appointments for all available titles. This has tended to make some units topheavy with officers. More of the work should be entrusted to the non-coms and privates. The manning tables accordingly set forth the number of officers to be appointed for units of various sizes. The intent has been to make a fairly liberal apportionment.

4. Incentives are given to building up membership by allowing more officers and higher grades for the larger units. Under this authorization, a number of well-deserved promotions may be made. Provision will be made in later instructions for promotion of officers of smaller units whose performance has been outstanding.

5. For the CAP Cadet program, additional officers have been authorized according to the number of Cadets. Such officers will be appointed as Assistant Training Officers, and in similar designations on CAP staffs and not as Cadet officers. Each Cadet unit has its own Cadet leaders, appointed in non-commissioned grades in CAPC. Officers of the sponsoring CAP unit are to exercise supervision but will leave the command in the hands of the Cadets insofar as possible to develop initiative and self-reliance in the ranks of CAPC.

6. Provision will be made under Title 17, Ratings, for appointment of officers by reason of skill, experience, and completion of CAP training courses, in addition to officers appointed by reason of functional assignment. Until further instructions are issued, ignore references to Ratings in Form 19.

7. Minimum standard for appointment of officers until further notice will be 100 hours of CAP training, completed in CAP courses or prior experience, pursuant to CAP Rules 3, as follows: 31-1, CAP Orientation, 2 hrs; 31-2, Army, 3 hrs; 31-3, Navy, 2 hrs; 31-4, Army Air Forces, 2 hrs; 32-1, Courtesy and Discipline, 3 hrs; 32-2, Infantry Drill, 20 hrs; 32-3, Safeguarding Information, 1 hr; 32-4 Articles of War, 1 hr; 32-5, Guard Duty, 4 hrs; 32-6, Reviews, 2 hrs; 32-7, Command and Staff, 2 hrs; 32-8, Leadership, 3 hrs; 32-9, Correspondence, 2 hrs; 32-10, Operations Orders, 1 hr; 33-2, Protection against Gas, 4 hrs; 34-5, Map Reading, 5 hrs; 34-13, Terrain Familiarization, 5 hrs; any other CAP courses, 38 hours.

42-8

18. Assignments

0. After assignment to a Wing unit of CAP (14-3) or to operations duty (18-5) a member may be assigned in functional title in such unit by written order of the unit commander (01-6) and will begin to serve in such title immediately without change in grade pending appointment in new grade (19) by reason of such assignment.

1. Titles for functional assignments and the grades usually assigned thereto in Wing units other than operations units will be as follows:

1 Command Titles: (a) Wing Commander, MAJOR, (b) Group Commander, CAPTAIN, (c) Squadron Commander, FIRST LIEUTENANT, (d) Flight Leader, SECOND LIEUTENANT, and (e) Section Leader, SERGEANT.

2 Staff Officers and Deputy Staff Officers of Wings usually will serve in the grade of CAPTAIN; of Groups, as FIRST LIEUTENANT; and of Squadrons, as SECOND LIEUTENANT. Assistant Staff Officers usually will serve one or more grades below the Staff Officers. Staff titles will be only as follows, and will rank in the order named on respective staffs: (a) Executive Officer, (b) Training Officer, (c) Intelligence Officer, (d) Medical Officer, (e) Communications Officer, (f) Supply Officer, (g) Adjutant, (h) Deputy Staff Officer, assisting the unit commander in functions other than the foregoing, (i) Assistant Staff Officer (e. g., Assistant Training Officer) assisting one of the foregoing Staff Officers.

3 Other titles of function: (a) Assistant Flight Leader, one to each Flight over 15 members, WARRANT OFFICER; (b) Squadron Sergeant, one to each Squadron, FIRST SERGEANT; (c) Flight Sergeant, one to each Flight, SERGEANT if Flight is within a Squadron or FIRST SERGEANT if the Flight is detached; (d) Assistant Section Leader, one to each Section up to 15 members or two if over 15 members, CORPORAL. Certain other titles may be used in CAP operations units when authorized by operations instructions.

2. Manning tables specifying the authorized number of Command and Staff Officers for headquarters of units of various sizes, as measured by the number of currently active members, as follows:

		Maj.	Capt.	1st Lt.	2nd Lt.	War. Officer	Total
1 Wings:	Under 200 members	1	4	3			8
	200 to 500	1	7	2			10
	501 to 1000	1	8	3			12
	1001 to 2000	1	9	4			14
	More than 2000	2	10	4			16
	Add for each 500 Cadets up to 2500	1					
2 Groups:	Under 300 members		1	4	3		8
	300 to 500		1	7	2		10
	More than 500	1	1	8	2		12
	Add for each 200 Cadets up to 1000				1		
3 Squadrons: (Not Including officers of Flights)	Under 75 members			1	4	3	8
	75 to 100			1	7	3	11
	101 to 150			1	8	4	13
	More than 150		1	1	9	5	16
	Add for each 50 Cadets up to 250					1	
4 Flights:	Under 15 members				1		1
	15 to 40				1	1	2
	41 to 60			1	1		2
	Add for each 25 Cadets up to 50 in Detached Flight: not in Flight within Squadron					1	

3. Application for appointment (19) will be sufficient notice to higher headquarters as to change in functional assignment except for Wing, Group, and Squadron Commanders and Detached Flight Leaders, wherein changes will be reported immediately (01-7).

4. Factors to be weighed in functional assignment include qualities of leadership especially, aeronautical experience, past service in CAP or in the armed forces, personality, attitude of the members of the unit, and the amount of time that the individual can devote to the work.

1 Commanding officers and executive officers of units which include flying personnel should be pilots. Medical Officers will be Doctors, Dentists, Registered Nurses, or Certificated First Aid Instructors. Communications Officers will be certificated radio operators. Other functional assignments will be filled by the best qualified members available. Staff vacancies may be left open, but filling of the 7 key assignments (18-1.2 a to g) is recommended. Minimum standards as to CAP training required for officers will be set in Personnel Instructions. Duties of Command and Staff Officers are set forth in Training Manual 32-7. Operations instructions will govern operations assignments.

5. Members may apply for assignment to CAP operations duty on Form 18-5 which includes the operations duty oath (10-4). Such applications require the signature of the unit commander and the Wing Commander attesting that the applicant possesses the qualifications prescribed in operations instructions for the assignment for which endorsed.

1 Assignment to National Operations duty will be by order of the National Commander or other officer designated by him for the respective operation. The Wing to which the member is assigned will be notified, will notify the member's Wing unit, and will send the member's duplicate application to National Headquarters for transmittal to the operations unit commander. On reporting for operations duty, the member will take the operations duty oath. Relief from duty may be made by the unit commander on expiration of the term for which the member has agreed to serve, or sooner by the officer authorized to order the assignment. The duplicate application will be sent to National Headquarters for return to the Wing for resumption of the member's Wing unit assignment (15-3) or for reassignment.

2 Assignment to operations duty under a Wing or unit thereof, or relief from such assignment, will be by order of the Wing Commander or other officer designated by him as in the foregoing paragraph except that the duplicate application will remain in Wing custody.

42-b

ANNOUNCING

Southern Flight's

NEW *Civil Air Patrol* HANDBOOK

A Sell-Out in All Previous Editions — Now Revised and Enlarged for Greater-than-ever Usefulness

Civil Air Patrol members from all over the nation have acclaimed SOUTHERN FLIGHT's CAP Handbook as the most complete and authoritative guide obtainable to Civil Air Patrol organization, regulations and operations. In the short space of less than a year, this book has become a CAP "Bible" to thousands of members who found it a reference "must" that they could use and trust.

Excerpts from just a few of the hundreds of unsolicited letters* that have come to SOUTHERN FLIGHT praising previous editions of the Civil Air Patrol Handbook are printed below.

Michigan—The Handbook alone is worth the subscription price that you are asking, and it is my sincere hope that at least every officer in the Civil Air Patrol will take advantage of your special offer, as it will be of the greatest advantage to them in keeping up their duties as Civil Air Patrol officers.

Louisiana—Your Civil Air Patrol Handbook I consider most practical, and I am sure it will meet with a wonderful response from members of Civil Air Patrol all over the country. The idea is an excellent one and you are to be congratulated.

Minnesota—We feel that this Handbook serves a very real need of both the enlisted and commissioned personnel of the Civil Air Patrol and should be required reading for all members.

Mississippi—We have about 250 active members assigned to the Mississippi Wing, and those of us who have had the former handbook have found it most helpful . . . SOUTHERN FLIGHT is enjoyed by the majority of the Mississippi Wing.

Kansas—We like your dad-gummed book and we like your magazine. . . .

Missouri—We want to congratulate you upon such a valuable handbook for the Civil Air Patrol. . . .

Wisconsin—I am glad to hear that you are printing a new CAP Handbook, as we have found the old one to be extremely useful. It has really been most helpful to have all the important CAP directives in compact and accessible form and I think all CAP members who were smart enough to take advantage of your offer owe you a debt of gratitude for this publication.

*Original letters in our files.

Durably bound and arranged for quick, convenient reference, this Handbook is complete, authentic, and up to the minute with the latest releases from CAP National Headquarters. Reserve YOUR copy now. . . . First come, first served when they come off the press. Use the handy coupon . . . and SEND IT IN TODAY!

SOUTHERN FLIGHT, P. O. Box 750, Dallas 1, Texas

Gentlemen: I want to be one of the first to receive a FREE copy of your NEW revised and enlarged CIVIL AIR PATROL HANDBOOK. Please reserve my copy. Here is my $3.00 remittance for a two-year renewal to SOUTHERN FLIGHT. It is understood that my subscription will be extended for two full years beyond its present expiration date and I will receive the new HANDBOOK without cost as soon as published.

(Please print Name and Address)

NAME..... CAP CONNECTION.....

ADDRESS .....

CITY..... STATE.....

AS YOU NEVER DROVE BEFORE!

Many a soldier owes his life to a commander who drove him to the utmost in battle—*never let him slacken for a single fatal instant!* And after the war, many a worker will owe his economic safety to a leader who drove him continuously for higher Pay-Roll allotments for the purchase of War Bonds!

Despite higher taxes and prices, the average worker still has more money than ever before—particularly on the basis of the *family* income. With others in the family earning, too, just let the worker 'figure it out for himself', and he usually will realize that *now* he can put more into War Bonds than he has been doing.

That's why the Treasury Department has set new quotas for the current Pay-Roll Allotment Drive—*quotas running about 50% above former figures.* These quotas are designed to reach the *new* money that's coming into the family income. Coming from millions of new workers . . . from women who never worked before . . . from millions who never before earned anything like what they are getting today!

The current War Bond effort is built around the *family* unit, and the Treasury Department now urges you to organize your War Bond *thinking*—and your War Bond *selling*—on the basis of your employees' *family* incomes. For details, get in touch with your local War Finance Committee which will supply you with all necessary material for the proper presentation of the new plan to your workers through your labor-management committees.

Today about 30,000,000 wage earners, in 175,000 plants, are buying War Bonds at the rate of nearly half a billion dollars a month. Great as this sum is, *it is not enough!* So turn-to today! Get this new *family income plan working!*

This Space Is a Contribution to America's All-Out War Effort By

SOUTHERN FLIGHT

Answer: Considerable work has been done to determine the effect of gunfire on magnesium. This has included firing tests on complete structures, such as wings, as well as on small panels. The conclusions reached may be stated as follows:

1. Magnesium is not ignited by incendiary bullets.

2. Solid shot does not affect magnesium structures much differently than it does aluminum. The shot removes the metal in its path but does not propagate cracks or tears excessively. There is much less "tuliping" than with aluminum and the holes are less ragged.

3. Explosive shells are more destructive to magnesium structures than to aluminum structures. Our observation has also been that solid shots into a large liquid container, such as a gasoline tank, produces an effect similar to an explosive shell and causes more damage to the magnesium surrounding it than to aluminum. Perhaps paradoxically, the British have had a very satisfactory use of magnesium gas tanks in their Spitfire airplane. These tanks are constructed as a welded framework of extrusions with the sheet welded in, patch fashion, as small panels. Their observation is that these tanks are not only considerably lighter (12 gal. more capacity and 9 lb. less in weight) than the aluminum tank previously used, but are also more resistant to gunfire because the magnesium does not "tulip" and prevent the external bullet-proofing rubber from sealing effectively. Such tanks are reported to be readily repaired.

PORTABLE SOIL CEMENTER CAN BE MOVED BY AIR

To expedite the building of airport runways and roads here and in combat zones, the Civil Aeronautics Administration and the Halliburton Oil Well Cementing Company of Duncan, Oklahoma, have developed special mechanical equipment for spreading soil-cement surfacing. No single piece of the spreader or the feeding accessories weighs more than 750 pounds, and all parts can be put into a standard door of a military transport plane.

Previously soil-cement paving was done by spacing the cement sacks at given intervals along the ground, cutting them open and then spreading the cement by hand. This required many man-hours, careful supervision and extended the handling of the mixture. It was difficult to obtain uniform strength of the paving.

The new Halliburton spreader is towed by a truck or tractor and distributes cement evenly over an area six feet wide in any quantity desired, between 0.3 and 0.75 cubic feet per square yard of surface. From a common hopper, eight six-inch conveyor screws feed cement to outlet spouts which distribute the cement on the ground. The amount of cement is regulated by a dial setting which controls the gear ratio between the driving mechanism and the conveyor screws by an infinitely variable speed transmission.

Dual wheels on the spreader produce the power by using an automobile differential so that the rate of the turning of the screws is directly proportional to the forward speed of the spreader.

ROLLING ALONG at steady speed, this newly developed soil cement spreader does the job faster and more efficiently than the old method of handling the materials by hand and guesswork.

★ ABILITY

★ PRECISION

★ PRODUCTION

DOLAN AIRCRAFT MANUFACTURING COMPANY

DALLAS, TEXAS

SKY'S THE LIMIT

(Continued from page 41)

aviation racket. It set us to thinking about a lot of things.

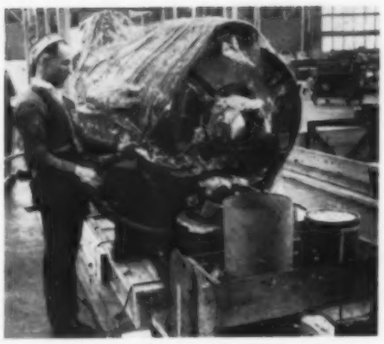
Recently, we have lamented the fact that whereas we have had 0-to-450 hp. ratings for a number of years, and that used to be pretty good, some of our friends now have 0-to-10,000 hp. ratings and have flown equipment that really have that many horses hooked up. We have lately seen a lot of Army boys flying big airplanes with several thousand hp. when those fellows actually had never been in an airplane until two years ago.

Some time ago, we witnessed an accident to a military airplane in which an instructor and a student were riding. The airplane was a beautiful twin-engine all-metal model and wasn't hurt particularly, but still it was one of those accidents where the thing got away from the student and the instructor couldn't control it before it ground-looped. We talked some to the instructor and found that he had about 1,200 hours, all gained, including his first flight training, during the last two years since he got into the service. Of that 1,200 hours, probably 800 hours had been riding with the students which probably made him, in effect, about a 400- or 500-hour man.

A few days ago, a twenty-two-year-old Army pilot took off a B-17, apparently with one motor functioning improperly. He stalled it off the ground near the end of the runway, stalled it over some trees, finally stalled it completely, hit a tree with one wing, was thrown into the ground and the plane and crew burned up. All indications observed by people with excellent qualifications for determining such things were that the pilot did not appear to understand that anything was wrong with his airplane and, consequently, flew it right on, because there were numerous fields into which he could have put the airplane had he known that he was having trouble.

This indicates to us that the mere obtaining of a 1,000 or 1,200 hours flying time quickly, does not mean that a person has become a pilot. We rather characterize a good many of the young military pilots as airplane operators rather than as pilots.

A comparable situation is in the manufacturing business where it has always been agreed that a five-year-old machinist, that is a machinist with five years of practical experience, was just a beginner and that a fellow was really expert after twelve to fifteen years experience. However, since the war, we are willing to call anyone a machinist who has had two years of machine experience and we actually



PLIOFILM RAINCOAT replaces greasecoat on Curtiss P-40's shipped abroad in crates. After 30-ft. long, 400-sq. ft. wrapping is sealed at seams, worker withdraws air to collapse pliofilm snugly around the plane. Bags of silica gel inside envelope absorb any moisture left inside.

make operators of complicated machines in about two or three hours instructions. Some people who have been machine operators for six months feel that they are entitled to as much money as a fifteen-year machinist. However, they don't know the first thing about anything, except that if they pull a certain lever a certain thing happens to the machine.

Some of us who have for one cause or another been unable to participate very actively in the war, that is, as soldiers in uniform, are likely to feel, from time to time, that we are a little left out and that all these youngsters who come back from the war with several years of experience, flying big, beautiful airplanes with all kinds of equipment such as we never operated in our lives, will be a lot better than we are and in the postwar aviation field, may outstrip us considerably. That, undoubtedly, will be true in certain instances. However, we believe from observation that the boys who have had several hundred hours, even including combat time, are not necessarily high-powered pilots and cannot necessarily pass any examination such as the CAA might want to have them do before they could engage in commercial work. A whole lot of these boys have not seemed to be able to put their airplanes into small places when they had to, nor to do anything else else except bail out when something happens.

We still have the feeling that the boys who learned back in the good old days, when they had to do everything to their own airplanes in order to keep them going, probably know more about flying than some of these young fellows who have gone helter-skelter through a school where everything in the world was hurled at them in short order, and were then turned loose to steer their airplanes and had somebody else to do about everything else required to be done.

A lot of us started into aviation a good many years ago, and this will make about ten years that we have had our license and fifteen years since we made our first airplane ride, and since we attempted to solo an airplane without any instructions. In ten years of peacetime, you can do a lot of talking and reading and thinking about airplanes which inevitably permits you to reach certain conclusions enabling you to perform according to second nature when an accident occurs.

The Army has recognized the fact that it is impossible to really make a first-class seasoned pilot out of a completely uninitiated person in two years time. They have, through the Civil Air Patrol, inaugurated a set-up known as the Civil Air Patrol Cadets. This is an organization of youngsters between sixteen and eighteen years old who may not be full-fledged Civil Air Patrol members, but who will receive all the training, instructions, etc. that it is possible for the older people to give. The Army hopes and expects that such chaps who are interested in becoming aviation cadets will have learned at least, certain fundamental notions and a familiarity with names and types of equipment before being inducted into the regular Army training courses. Personally, we are convinced that every iota of training that can be given to a person will be useful, and that in every case the longer the time that the training can be spread over, the more effective it will be. That is, a greater amount of it will be absorbed by the trainees.

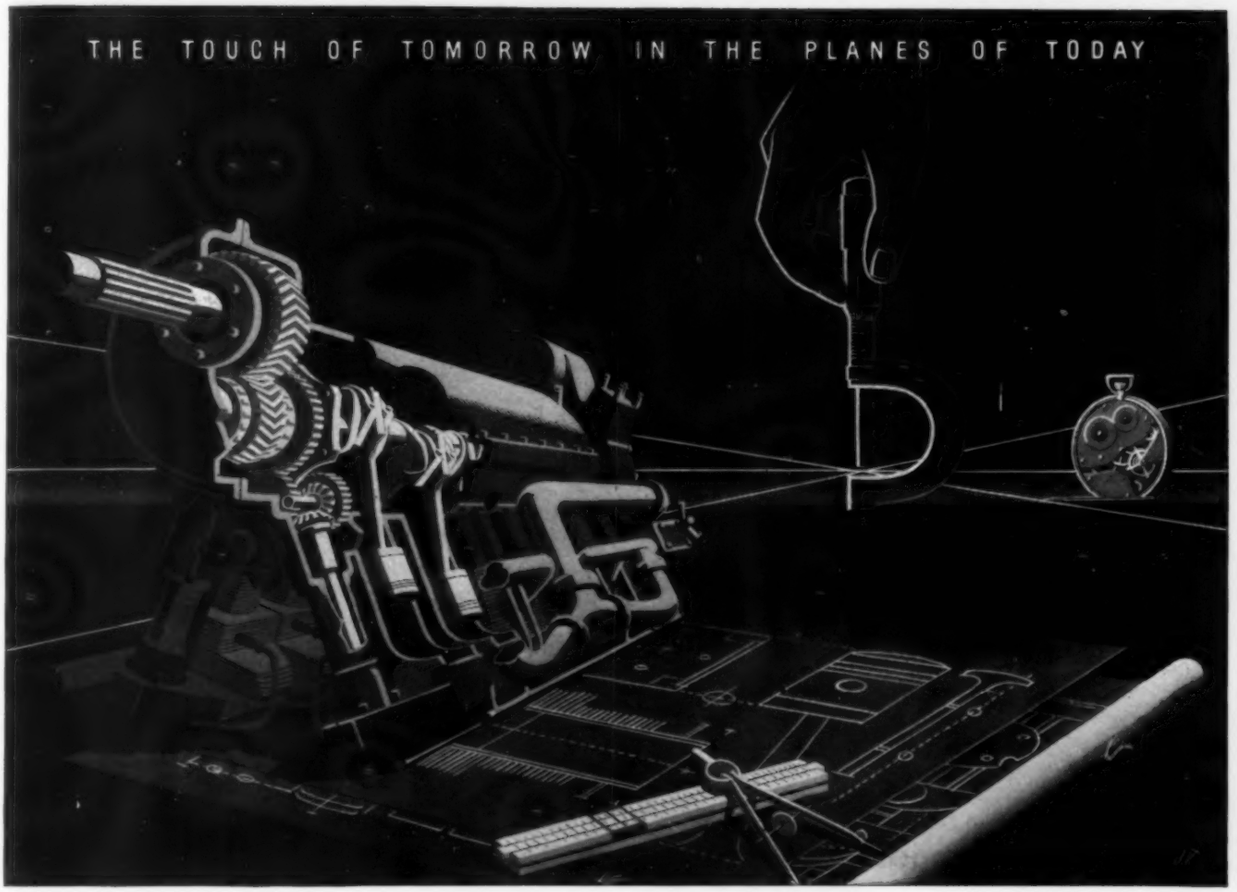
Perhaps one of the greatest benefits that will accrue from the Civil Air Patrol may be the training of vast numbers of youngsters in preparation for their fundamental and basic airwork when they become of age and are inducted into the Air Corps.

Airplanes for the Private Pilot

In the last few weeks we have travelled about 5,000 miles by air; comparing it again with previous trips which we have made in the last couple of months by train and by automobile, we are still convinced that sooner or later most business people are going to have to make a good many of their trips by air.

It has gotten down now to where almost any business man devotes one-fourth, or more, of his time to government red tape, which seems rather on the increase than on the decline. And, therefore, in view of increased competition, greater difficulties, etc., in order to do the same work that a man previously did to make a living,

(Continued on page 54)



How Precise is Precision?

Maybe *your* yardstick is a fine watch. *Ours* is a Ranger 12-cylinder in-line, air-cooled engine. See the comparisons between the two listed below.

A whole battery of fine laboratory instruments, plus the genius of craftsmanship, are responsible for the Ranger's outstanding precision performance.

There's the spectroscope, for example—so sensitive it can spot a particle of metal as minute as seven parts in a hundred thousand. Fairchild uses it to explore and to control the metals in Ranger engines.

A quarter million volt X-Ray is another Fairchild key to secrets that are hidden beneath 4 inches of solid steel. It tells our engineers which metals can "take it."

Under a metallurgical microscope our technicians can read the history of any metal . . . tell how it was processed during manufacture.

With electrical instruments they can detect a flaw one ten-thousandth of an inch in depth that *could* become a bottomless pit of danger.

A beam of black light is played over machined surfaces to expose the structural "criminals" that may lurk within.

These and hundreds of other present-day miracles are routine matters for Ranger engineers and scientists. Result—the Ranger Engine...combination of precision and power . . . another Fairchild "touch of tomorrow in the planes of today."

A QUALITY WATCH	A RANGER ENGINE
PARTS—about 350.	PARTS—exactly 4,127
PRECISION measurements—wheel pivot held to a tolerance of 1/2 of 1 per cent of its diameter.	PRECISION measurements—impeller shaft held to a tolerance of 1/10 of 1 per cent of its diameter.
SPEED of moving parts—balance wheel oscillates 5 times per second.	SPEED of moving parts—fastest part revolves 520 times per second.

BUY U. S. WAR BONDS AND STAMPS

RANGER AIRCRAFT ENGINES

Division of Fairchild Engine and Airplane Corporation · Farmingdale, Long Island

In the tomorrow that is nearly today,
Mr. Everyman, stopping over on business, will step from
the giant transport plane to a waiting air taxi
that will wing him direct to the roof of his downtown
destination.

PRESIDENT

BRANIFF *Airways*

Chicago, Burlington, Kansas City, Wichita, Ponca City, Oklahoma City, Dallas, Ft. Worth, Houston, Galveston, Amarillo, Wichita Falls, Waco, Austin, San Antonio, Laredo, Corpus Christi, Brownsville, Denver, Pueblo, Colorado Springs

FUEL FOR 200,000 BOMBERS

A fleet of 200,000 bombers is just an airman's dream—there aren't that many bombers. To put such an imaginary fleet into the sky would require a tremendous amount of gasoline, but one Humble refinery has already produced enough 100-octane aviation gasoline to do the job. 500,000,000 gallons of fighting aviation fuel—enough to fly a mythical armada of 200,000 bombers on a bombing raid over Berlin.

From the same refinery have come other Humble-Esso Aviation Products: thousands of gallons of Esso Aviation Engine Oils, high-octane gasoline for training planes, base materials for special aviation greases and lubricants—all a part of Humble's war job to which the best efforts of 13,000 Humble employees are dedicated.

Esso

Humble-Esso Aviation Products

Today Humble-Esso Aviation Products serve the vital demands of war; tomorrow they will serve equally well the needs of peace.

HUMBLE OIL & REFINING COMPANY

Cargo flown by Civil Air Patrol in lightplanes such as this Aeronca includes munitions samples which, in this case, were flown 100 miles from factory to proving ground for test-firing, saving hours of manpower and machine time by expediting tests. Couriers also carry mail, spare parts for combat planes, baggage and many other items.

While air cargo enthusiasts dwell on the wonders of flying boxcars, Civil Air Patrol Courier Pilots with a job to do have found surprising usefulness and economy in 65-horse Lilliputs. For a small-scale preview of what to expect in feeder-line operations come peace, here's their report covering 3,541 hours in the air.

AIR CARGO *by Jeep*

By MAJOR T. B. ROBERTS, JR.
Commanding Officer, Wing 77, CAP

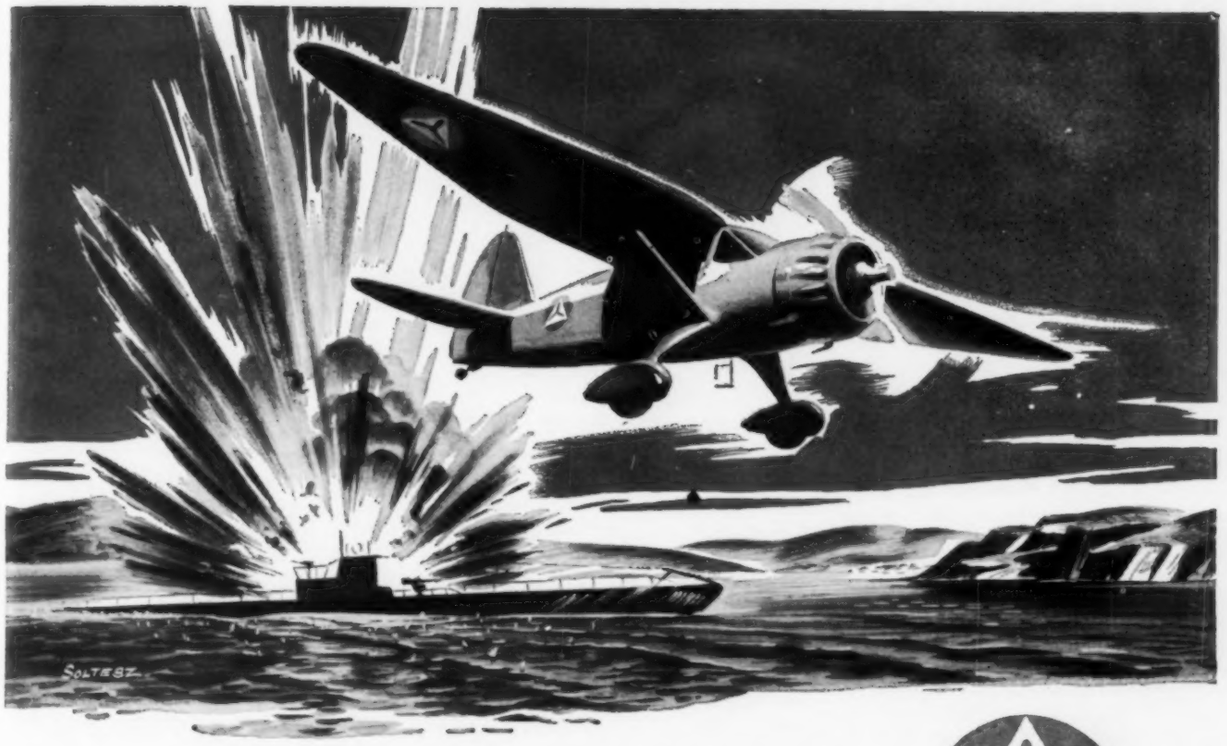
THE mythical character of the "Lone Ranger," who rode the plains of the central and western United States in the pioneer days, has today found his counterpart in the "Courier Pilot," who spreads his acts of service, mercy, and justice, not from the back of a charging steed but from the cockpit of a "Flying Jeep," in whose nose cracks the thundering snap of many hoof beats. The "Lone Ranger's" range has been extended, his field has been broadened, and his operations increased. This is all by way of saying that the modern, light plane—even as we know it today—which is probably not much indication of what we may expect in the postwar period — has demonstrated certain very definite useful and economical characteristics.

That the Civil Air Patrol through its Courier Service has made it possible for us to apply a yardstick to operations, is the reason why we can talk of the usefulness of the light plane and its economy, with figures to justify our statements.

Small Engines Have Stamina

Heretofore cross-country operations of the private flyer have largely centered on planes with at least a hundred, and from that up to four hundred and fifty, horsepower engines. Economy has never been a deciding factor with such ships. Payload, speed, and serviceability have always taken precedence. The light plane of sixty-five horsepower or less has been used principally for training purposes. It never carried enough passengers to be a barnstorming ship, nor has it ever had enough speed to interest licensed pilots to use it in cross-country flights. We assumed it was built for training, and for use in building up time in solo work. The fact that it has surprised most everyone who has kept a record on its operations in Courier Service is due largely to the stamina that has been built into the light-plane engines by their manufacturers. In fact, records are frequent where these engines have operated over 600 hours without changing a spark plug. Compare these little four-cylinder, horizontally opposed "putt-putts" with those of any

(Continued on page 50)



On Coastal Patrol with the CAP

Pilots of the CAP, flying many thousands of miles of over-water patrol in light land-planes, have done a magnificent job in helping to smash the wolf-packs of Nazi submarines which menaced our coastwise shipping. Simmonds-Benton Shielded Spark Plugs have played their part too, by giving dependable performance under the rigorous conditions of wartime service. The three-part, interchangeable construction of these plugs insures longer life as well as lower maintenance and operating costs. Built-in economy, plus complete reliability makes Simmonds-Bentons a "must" when you order your next set of plugs. Simmonds-Bentons will not let you down.

Lt. Jack C. Neal, CAP Coastal Patrol pilot (left) and Flight Officer Clarence C. Barrett, prior to take-off on routine anti-submarine patrol at a Gulf Coast Base. The Lycoming-powered Stinson Reliant is equipped with Simmonds-Benton Shielded Spark Plugs.

SIMMONDS
AEROCESSORIES INC.

10 ROCKEFELLER PLAZA, NEW YORK, N. Y.

PACIFIC COAST ADDRESS:
6253 HOLLYWOOD BLVD., HOLLYWOOD, CALIF.

AIR CARGO BY JEEP

(Continued from page 48)

of the radial motors, and on the overhaul and operations chart you will find your answer.

This is probably the reason, well founded, why operators and others interested in postwar operations of feeder lines have evidenced so much curiosity in any record of facts pertaining to the operation of the so-called light planes. Their glances have been turned to the couriers, who are flying regular schedules, meeting the time factors in all kinds of weather, and carrying maximum loads. They want to know the cost per mile of operation, the maximum payload for good operating efficiency, and with those facts to start with they can very easily figure their feeder line to a gnat's eyebrow. The process of adding insurance, pilots' hire, depreciation, obsolescence, ground crew, dispatching, etc., is simple to the business man when he has a known value to start his computations.

It would probably not be good policy to give specific quotations on the operation of any one plane or engine, because this knowledge has been gained as an officer of the Civil Air Patrol operating in South Dakota. To offer as general information figures gathered from a fleet of light planes used in Courier service under my command, is permissible and informative.

To start with, let's get these facts definitely established in our mind. First, the light airplane empty weighs 800 pounds or less. Second, you add a pilot at 170 pounds, at least fifteen gallons of gasoline at six pounds per, a few quarts of oil at seven pounds, and they can still carry two hundred pounds and over as cargo load. Third, the engine will operate on from three and one-half to four and one-half gallons of gas an hour. The oil consumption is negligible. Fourth, dual ignition almost precludes the possibility of engine failure. Fifth, the plane can almost be landed on a dime, or taken off from two of them laid side by side. This obviates most all the chances of structural damage to the plane itself.

Now take a pencil and paper and figure out for yourself the payload in a light plane, as compared to any ship flying a radial engine or an in-line engine of 100 horsepower or over. The results will surprise you, especially if you haven't given much thought to the problem. We are talking economical operation, simply because it is realized that aviation must be made to justify itself on this basis before we can expect it to become a factor in postwar commercial or social fields of transportation. This opens a broad avenue of thought and confronts the plane and engine manufacturer with the problem of maintaining a balance of cargo load, with increased weight and power. Whether the happy medium will be reached by a light-plane manufacturer climbing up to it or the builder of heavy equipment coming down, it remains to be seen, but the fact is that within the realm and reach of them all is a Utopia of efficiency which must be attained.

FIGURES PROVE LIGHT PLANES' UTILITY

Breakdown of Courier Service in 65-h.p. airplanes performed by South Dakota Wing, Civil Air Patrol, Jan. 1-July 1, 1943, in connection with Second Air Force:

Period	Mileage	Hours Flown	Flights Completed	Flights Cancelled	Planes used	Lbs. cargo	Pouches mail	Pilots' pay	Cost Plane Operation at $5.92 per hr.
Jan.	22,630	454	96½	87½	9	8,041	176	$ 1,708	$ 2,687.64
Feb.	33,950	475	101½	66½	8	7,921½	180	$ 1,708	$ 2,772.50
Mar.	42,175	583:50	125½	60½	8*	10,344½	213	$ 1,708	$ 2,865.28
Apr.	40,490	561:35	121	59	8*	7,466½	221	$ 1,708	$ 3,324.68
May	47,295	753:30	140½	45½	8	12,180	223	$ 1,708	$ 3,868.72
June	55,934	812:35	166	46	9*	29,860	278	$ 1,708	$ 4,751.58
Totals	252,474	3541:0	751	335	50	65,813½	1291	$10,248	$20,962.72

Cost per pound cargo, 49 cents.
Cost per mile, 12 cents.
***7 planes used two weeks of period.**

Figures Show Proof

To further intrigue this situation, let me give you some figures. These have been taken from Courier operation of not less than seven or more than nine planes over a period of time from January 1st to July 1st of this year. These planes flew a total of 252,474 miles, which they made in an average of seventy-one miles per hour. They completed 751 scheduled flights and cancelled out on 335 because of weather. The average load was far below capacity, but they hauled all available material and filled the bill and purpose for which they flew. The cost to the Army for this service was twelve cents per mile, and on a comparative basis with government contracts for moving specified cargo, was way below any figures of public record. Cargo has been flown in light planes for less than the above figure per mile, but that was on special and designated trips. The above operations, it should be remembered, cover six months' continuous flying on schedule. The pilot's pay continues over the day's checkout, though the plane cost per hour was abated.

We realize that airlines haul passengers at a rate of five cents a mile. There have been instances where the airlines have accepted government contracts for hauling the mail at less than a mill per mile. In the first instance there is usually a mail contract that exceeds thirty cents a mile, and in the second where the bid was so low, the purpose was obvious. These show nothing of tangible cost, but the twelve cents establishes a low rate at known cost and mileage. This is important because we know the Army pays $8.00 a day to the pilot, and $5.92 an hour for the use of his plane, which last amount covers insurance of two kinds, depreciation, and maintenance. Suppose we knock off the pilot's pay and just figure the operational cost to the government, which under normal circumstances is what the private owner would want to know, and we have a fraction over eight cents per mile. This is getting down into the class of other transportation, but still not low enough, to our way of thinking, to popularize private aviation. It is still highly probable that the postwar period may see an operating cost of three cents per mile, because on our figures the insurance rate is figured at about seventy-two and one-half cents per hour. This rate is obviously too high as the rate of accidents will not justify it. Courier operations will do much to establish an actuarial basis for the postwar period far below this figure.

Now we come back to that mythical plane of which we spoke. It would seem that we have pointed out that the light plane can meet existing transportation rates and usefulness, but that we must search farther into the realms of Utopia for the vehicle which balances all of our demands for speed, and efficiency in operation, as compared to payload capacity. Shall we go up, or come down, to meet the private flyer's fancy, and the feeder line officials' demands? "Aye, there's the rub." In the meantime the "Lone Ranger"' (the Courier) rides on. "Hi Ho, Silver!"

"Greatest Piece of Transportation in This War"

The Home Front *

By TOM TREANOR

. . . The greatest piece of transportation in this war is the Douglas DC-3 transport plane . . . (which) has won more battles than the jeep.

. . . without the DC-3 there would never have been the weblike system of military airlines all over the world . . . now known as the Air Transport Command. Without the DC-3 the Air Transport Command would have been set back a good year.

And without the Air Transport Command there's many a battle in this war would have gone slower or even completely sour.

To give one example, ever since the fall of the Burma Road the Chinese war has been supplied almost entirely by the DC-3.

Don Whitehead of the Associated Press tells me that during the Tunisian campaign 15,000 casualties were evacuated in DC-3's without the loss of a plane or a life.

A surgeon told him that a principal reason for the extremely low American battle death rate was the rapidity with which the wounded could be brought to fully equipped hospitals by plane.

During the western desert campaign Whitehead says that without the supplies which were ferried to the front by DC-3's the 8th Army's advance would have been slower and the Africa Korps could have dug itself in for determined stands instead of being nearly routed.

"We'd often see them coming over the desert in formation," he said, "flying so low they seemed no more than five feet above the ground, rising and falling with each ridge. Sometimes they'd come into advance airports while the dust of enemy bombings still hung in the air."

*"The Home Front" is a daily feature in the Los Angeles Times. The foregoing are excerpts from this column which appeared Sept. 6, 1943. Tom Treanor is literally a "self-made" war correspondent whose colorful exploits on many fronts have won him acclaim. Reference to the DC-3 also applies to the C-47 Skytrain and C-53 Skytrooper, basically identical models. This material is reprinted with the appreciation of the men and women of Douglas who build the planes Treanor praises.

DOUGLAS *Aircraft Co., Inc.*

Santa Monica, Calif.

LONG BEACH, EL SEGUNDO, AND DAGGETT, CALIF., TULSA, OKLAHOMA, OKLAHOMA CITY, CHICAGO

Member, Aircraft War Production Council, Inc.

THE SEQUENCE

(Continued from page 38)

are going to do your entire flight by pressure and this is your first chance to feel it. Only by your ability to feel the subtle pressures exerted by your controls is your flying rated.

As your plane leaves the ground, allow it to climb for a second or two, then ease the stick forward to level flight until your engine has audibly eased its strain and you have picked up a speed at least twenty per cent over stalling, at which point you gently raise your nose to the horizon and climb to the prescribed 400 feet. As your engine picks up and eases itself, gently throttle back to keep it from racing. The fine co-ordination of throttle is a beautiful thing to see. Keep your track straight ahead, use a little upwind aileron and downwind rudder if neccessary.

When you reach 400 feet, ease your throttle back still more, level off and then *LOOK* and *LOOK*, proving your neck is not stiff, and *LOOK* on either side and to the back of you. Then execute a ninety-degree turn to the left, neither gaining nor losing altitude in the turn. Then fly straight and level as the individual traffic plan on the airport describes, at which time you again *LOOK*. The Inspector is really going to check that "look". The millions of miles flown in the past few years at controlled airports without a fatality proves that you must clear your turns.

Leaving the Traffic

If your field is way out in the country with poor check points and no sectional lines running straight, gauge your ninety-degree turn to the left by lining up some prominent object with your left shoulder and then turn to that object. Remember the turn you make is ninety degrees on the ground, so allow for that wind drift.

Your next maneuver is a forty-five-degree turn to the right which is designed to break you out of traffic. If this turn is executed under 500 feet, it is also level; if over 500 feet, you can do a climbing right turn for forty-five degrees.

In gaining altitude, there is only one accepted way, and that is by a ninety-degree turn with your inner wing, and your nose on the horizon, with enough added r.p.m.'s to take care of the climb. This is the hardest of all turns and your ability to hold your nose and wing on the horizon consistently is highly regarded. If the weather is rough, you of course will find it impossible to hold your wing steady, but your recognition of your wing's position at all times is the basis for the score.

Now in taking off and in climbing, regulate the little bumps you get from thermals with your rudder only. DON'T BE A "STICK JIGGLER." The least amount of movement in your stick consistent with results is what proves to your checker that you are comfortable and not tense. Hold your stick with your first two fingers and thumb, then rest your forearm on your leg and use only your wrist to fly with. It is not necessary to hold the rubber grip at all. Grasp the stick at the point where you can most comfortably sit and relax. If you are not comfortable and relaxed, you certainly can't fly.

After reaching an altitude of 800 feet, if there are no towns or other obstructions between you and your practice field, go into your co-ordination exercises on the way to your crossroads, keeping them up until they are in sight and judging the distance. When you think you are in the right spot start letting down. This is only done in one way, and that is ninety-degree gliding turns, remembering to flush your motor frequently. Let down to 500 feet and place yourself in a position to execute your first maneuver: the Rectangular Course.

Co-ordination and Concatenation

Now is the best time I can think of to go into the subject of co-ordination. You have just completed your co-ordination exercises on the way from the airport to your practice area.

The term or word co-ordination as used in an aeronautical sense is probably our most abused and misused word of all. We will attempt to clear this up so that your proper understanding of it will make it easier to comprehend what your Instructor means. As the term now stands it is all things to all men.

Webster says, "co-ordination" is equal in, or harmonious, functioning. The CAA manual uses the term in the pre-solo sense by stating it is equal pressure on stick and rudder simultaneously. Our definition is "anything necessary to make our airplane do what we want it to do and still keep the ball in the center"—in other words without slipping or skidding.

Now when we do a cross-wind takeoff, we very definitely cross our controls by lowering our windward wing into the wind, offsetting this pressure by pressing sufficiently on our downwind rudder to keep us headed straight. We also use an actual cross control and even a single control in Lazy Eights and Chandelles, and in Slow Rolls we definitely cross our controls. So in differentiating the words we will use the same word Zweng uses, "concatenation," which, according to Webster, is defined as "A linked series, a series of links united, a series or order of things depending on each other."

Co-ordination is difficult and its ease of execution is made more so by another new term or word, "torque." Torque is defined by Webster as "that which produces, or tends to produce, rotation or torsion." This rather peculiar phenomenon is produced by the propeller and in this country our propellers always turn to the left; therefore our twisting motion is to the left. In the English ships this effect is exactly opposite.

We are interested in this action of our ships, as it explains to us why, in turning to the right, our control movements are so different from those used in turning to the left. That is the reason we can not be mechanical in our flying and must develop a feel to automatically recognize these varying pressures. As an example, let us do a turn to the right. We find a considerable excess rudder pressure necessary but less pressure on left stick. In turning to the left, we find the assistance of torque requires less rudder, but more stick.

In doing our co-ordinating, we of course do the familiar Dutch Roll, in which we bank from side to side, keeping our nose on a point. We start out with a shallow bank, steadily increasing our bank and keeping our nose straight. This requires a delicate sense of feel. It is of course impossible to do this maneuver and keep our ball in the center. A lot of practice on this will make you a much smoother pilot.

The "Fight on the Horizon" is also another helpful co-ordination exercise and it consists of drawing the figure eight with the nose of the ship on the horizon, cutting the middle of the eight with the nose at the same place each time. We raise our nose fifteen degrees below and above the horizon in making the body of our eights. This is especially useful in giving us the feel in climbing turns and in executing this we must keep our ball "glued" to the mid-line.

We also have a turning maneuver in which we execute forty-five degrees from our original track, completing the turn and turning back. We do this in each direction, again keeping our ball steady.

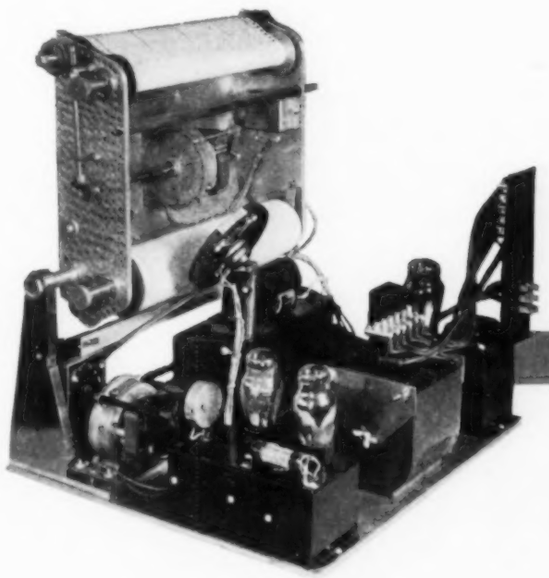
With this added to our bag of tricks, we can now proceed to our rectangular course and the low sequence work.

Next Month — Low Sequence

E.L.I.

Engineering Laboratories, Inc., is busy today building vital aviation and other military equipment, ranging from landing gear shock strut assemblies to pressure reducer valves for automatic pilots. At E.L.I. the manufacture of equipment to exacting precision standards on a production basis is an interesting story of over twelve years experience in the development of many instruments and services that are in World-Wide use by the Petroleum Industry.

Linked with our complete facilities for precision manufacture on a production basis, E.L.I. maintains a large staff of engineers with seasoned experience in many fields, whose services are available on a very flexible basis as desired • Consulting • Engineering • Design and Development Work • Testing and Manufacture, or any part thereof. Customarily working on a cost-plus or contract basis at reasonable rates, we welcome your inquiries.



E. L. I. Type PER-1 RECORDER

This latest type multiple-trace, direct-printing recorder achieves a frequency of printing above that of previous multiple-print recorders, with an extraordinarily small number of moving parts. A single light source projects a beam of light onto the translucent scale, thus permitting the instantaneous value of any function to be read at any time. A travelling carriage passes back and forth across the width of the chart, and when each light beam is intercepted, its position is printed on the chart, making a permanent ink record on paper, which is not chemically treated in any manner.

THIS IS AN EXAMPLE OF A DEVICE ESPECIALLY ENGINEERED BY US TO OUR CUSTOMERS' NEEDS.

Engineering Laboratories, Inc.

CONSULTING ENGINEERS & MANUFACTURERS

602-624 EAST FOURTH STREET

TULSA, OKLAHOMA, U. S. A.

EQUIPMENT IN E.L.I. **WORLD-WIDE USE**

SKY'S THE LIMIT

(Continued from page 44)

he is going to have to work harder, go more places, do more things, and do them all cheaper.

Some time ago, we made a trip from Corpus Christi, Texas, to Tulsa, Oklahoma, on the train. The round trip, starting from Tulsa at 11 o'clock at night required thirty hours one way, on account of the train's schedule, and thirty-two hours the other way, a total of sixty-two hours. The cost of the round trip, not including meals, was $40.00, approximately. Not many days after that, we made the same trip in an automobile. That trip required about thirty hours of elapsed time for the round trip. Fifteen hours at a stretch is an awful long time to drive and usually such trips are broken up into two-day trips, so that there would have been another twenty-four hours added to that trip, comparatively. It is, however, possible in an emergency to drive fifteen hours and we have done it a number of times. The cost for driving approximately 1,500 miles in a car usually runs around $90.00, considering the depreciation on the automobile, gasoline, etc. A few days ago, we flew to Corpus Christi and returned in our Culver, which required six hours for the trip down and five hours for the trip back, eleven hours for the round trip. The cost of operating the Culver, all told, is about $4.00 per hour, which would be a cost of $44.00 for the round trip. Therefore, one sees immediately that the automobile, although being second best for speed, is the most expensive, the airplane is the best for speed, and very nearly comparable in price, and the train is slightly the best for price but the slowest method, all things considered. If a person's time is worth anything, then it is worth a great deal to him to fly, especially on long trips. However, it pays on short trips, too. For example, one day this week we were sitting in Tulsa at 10:30 in the morning and it became urgently necessary to get certain material and hold a conference with one of the war plants at Wichita, Kansas, a distance of 140 miles by air, but 200 miles by road. By train it is practically impossible to get there at all. We called on the telephone, made arrangements to have a luncheon conference, drove out to the airport, got in the Culver and were having lunch in Wichita at 12:30. (Note that it takes about half an hour to get to the airport here, get the clearance, and get up there.) At five minutes of 2:00, we had our material, were through with the conference, and started back, arriving at Tulsa at 3:00 o'clock and being back in the office before 3:30. A lot of people who witnessed that trip would not have believed it possible had they not seen the material which could only have been obtained in Wichita. The cost of that trip was two hours and ten minutes of flying, which would have been approximately $8.50. The one-way trip on the airline is considerably more than that, but there is always the work of getting priorities, getting a seat, making the schedule, etc.

All of those airplanes with which we have had experience in the last few years have been too expensive to oprate, with the exception of the Culver. Another airplane which we own is powered with a similar engine, but because of its considerably slower speed actually costs twice as much per mile to operate as the Culver does. The cost per mile is the item in which most people will be interested, and that is inalienably connected with the speed and low horsepower.

We know of several airplanes now being designed and one that has already been built that may be the exact answer to the normal private pilot's problem when the war is over. There is one thing that most people will have to keep in mind, and that is that it probably will never be feasible for most people to operate high horsepower airplanes no matter what the speed at which they operate because such airplanes have a high first cost, and a high operating cost. We think that the Culver is somewhat underpowered, but would not advocate very much more horsepower for a similar type of airplane for the simple reason that it would require more gasoline, more weight, and consequently the performance would not be improved appreciably. Many airplanes with which we are familiar that have operated in the 150-to-450 hp. class, have cost as much as five times the cost per hour, without in any case increasing the speed over 50 cent of what the Culver will make. We have talked recently with a lot of pilots who feel that they would settle off for a peacetime airplane that would honestly make around 150 miles per hour. If such an airplane could be designed that would be two-place, and would use, let's say, the Franklin 120 hp. engine, using a constant-speed adjustable propeller so as to give good take-off, then we believe there would really be a demand for such a machine. Culver has really shown what could be done with a little bit of horsepower, and a little patience in streamlining. After talking with Al Mooney, Chief Engineer at Culver, we know that it wouldn't be difficult for him to make further improvements, which, together with additional horsepower, should make it do about what most people would want it to do and still have the stability and safety required. As a matter of fact, a lot of times we would just as soon commit suicide after considering all the problems and difficulties imposed by the war, but we are just sticking around to see what kind of new airplanes will be developed out of this business.

AIR SERVICE COMMAND

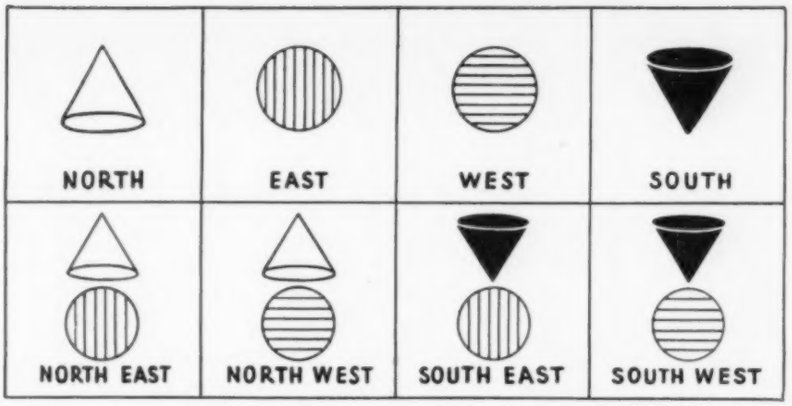
(Continued from page 37)

plane. In addition, about fifty man-hours are required to put each plane back into flying condition.

Because airplanes and parts weigh only about a third as much as other cargo, a ship cannot be loaded entirely with planes—the ship would not go deep enough in the water. Many of our stripped-down planes are now being taken across on tankers, which have been fitted with a wooden deck built about four feet above the steel flat top.

Lend-Lease planes destined for Latin America, and most of them are trainers, are flown by the Air Transport Command from the factories to San Antonio, Texas, where the Air Service Command takes over. ASC workers paint them with the insignia of the country to which they are consigned, give them a final check-up and make necessary changes, and then turn them over to accredited representatives of the country of destination, who then arrange for personnel to fly them away. ASC furnishes these pilots detailed instructions on the planes, the ferry route, terrain and weather conditions, and other necessary data. The ASC also provides spare parts, if they are needed, and maintenance at stops along the way from San Antonio as far as Guatemala. From there the AAF's Sixth Air Force takes over as far as Panama. The San Antonio depot has cleared more than 1,500 Lend-Lease planes to other countries to the South, but fewer than one per cent have been lost. Recently one of these, bound for Brazil, crashed in a jungle near Vera Cruz. An ASC crew, sent to the scene, used boat, oxen and truck to salvage the plane.

An air express service is also operated by the ASC. It is called the 39th Air Freight Wing, and it handles all ASC freight as well as air shipments for all War Department agencies within continental United States. Air freight terminals at 117 points along the Army's 50,000-mile air transport system in the U. S. are operated by the 39th, which loads all of the air cargo planes flown by the Air Transport Command and prepares routings and handles millions of pounds of air freight monthly.



This chart shows the signals for the four primary and four combination wind directions which guide pilots on take-offs and landings. The spheres with vertical bars are yellow (for east) and the horizontal barred spheres are red (for west).

Here's an idea gained from Beechcraft which will be of value to others operating planes off airports with terrain irregularities and crowded installations.

Effective Signal System

For Irregular Fields

By J. P. GATY

THE Beechcraft factory at Wichita, Kansas, is flanked by two runways. Airplanes on the end of one runway are invisible to the pilots of the airplanes at the end of the other runway. Field visibility is also somewhat hampered by the fact that a low ridge runs down the middle of the field. This ridge provides excellent field drainage conditions, but may conceal one airplane from the pilot of another. In order to eliminate take-off and landing accidents caused by these special conditions, a set of signals was devised by the Corporation. These signals are flown from a special yardarm mast located on top of the factory buildings and are visible to the pilot of an airplane at any position on the field or in the air anywhere within three miles of the plant.

An attempt was made to rationalize the signals so they would be remembered easily so that confusion would not result from a misinterpretation of any signal.

There are four runways, and landings can be made in any one of eight directions corresponding to the primary points of the compass. Four primary signals and four combinations of two each of the primary signals take care of these eight landing directions. Each signal is eight feet in diameter and is easily interpreted from a distance of several miles. Landings and take-offs are made in the direction indicated by the signal which is being flown at the time.

The rationalization of these signals is as follows:

1. The signal to land north is a white cone flown with its point upward. This signal corresponds with the north point of the compass on any compass rose, and the white color is symbolic of the snow and the cold climate found in the northern regions.

2. The signal to land south is a black cone flown point downward. This obviously is the antithesis of the signal for north.

3. The signal to land east is a yellow sphere which is symbolic of the rising sun. In the morning, the sun ordinarily comes up in a clear atmosphere and therefore is yellow in color on the eastern horizon.

4. The signal to land west is a red sphere which symbolizes the setting sun sinking in the haze created by the atmospheric moisture which it has drawn from the earth during the day.

These four primary signals can be combined to form the other four landing directions. For instance, the signal to land northeast would be the white cone with its point upward flown above the yellow sphere; the signal to land southwest would be the black cone flown point downward above the red sphere.

The signals are made of canvas with wooden hoops inserted to give them the necessary shape. A steel cable with attachment hook at each end runs from top to bottom through each signal so that they can easily be attached to the hoists. They are collapsible and are simply folded up and stored in a rack when not in use. The field manager is responsible for the operation of the system of signals.

This photograph offers a study of comparison and perspective as the cone and sphere hang above the Beechcraft factory roof.

Streamlined Symphony

By ESTHER H. FORBES

IN designing the Airacobra, the engineers of Bell Aircraft Corporation aimed at two chief characteristics — firepower and speed. To favor these without sacrificing other aspects of performance they streamlined the plane on the lines of a racer, reducing drag wherever possible. In much the same way Bell production engineers have achieved speed in the production of Airacobras by streamlining operations throughout the company.

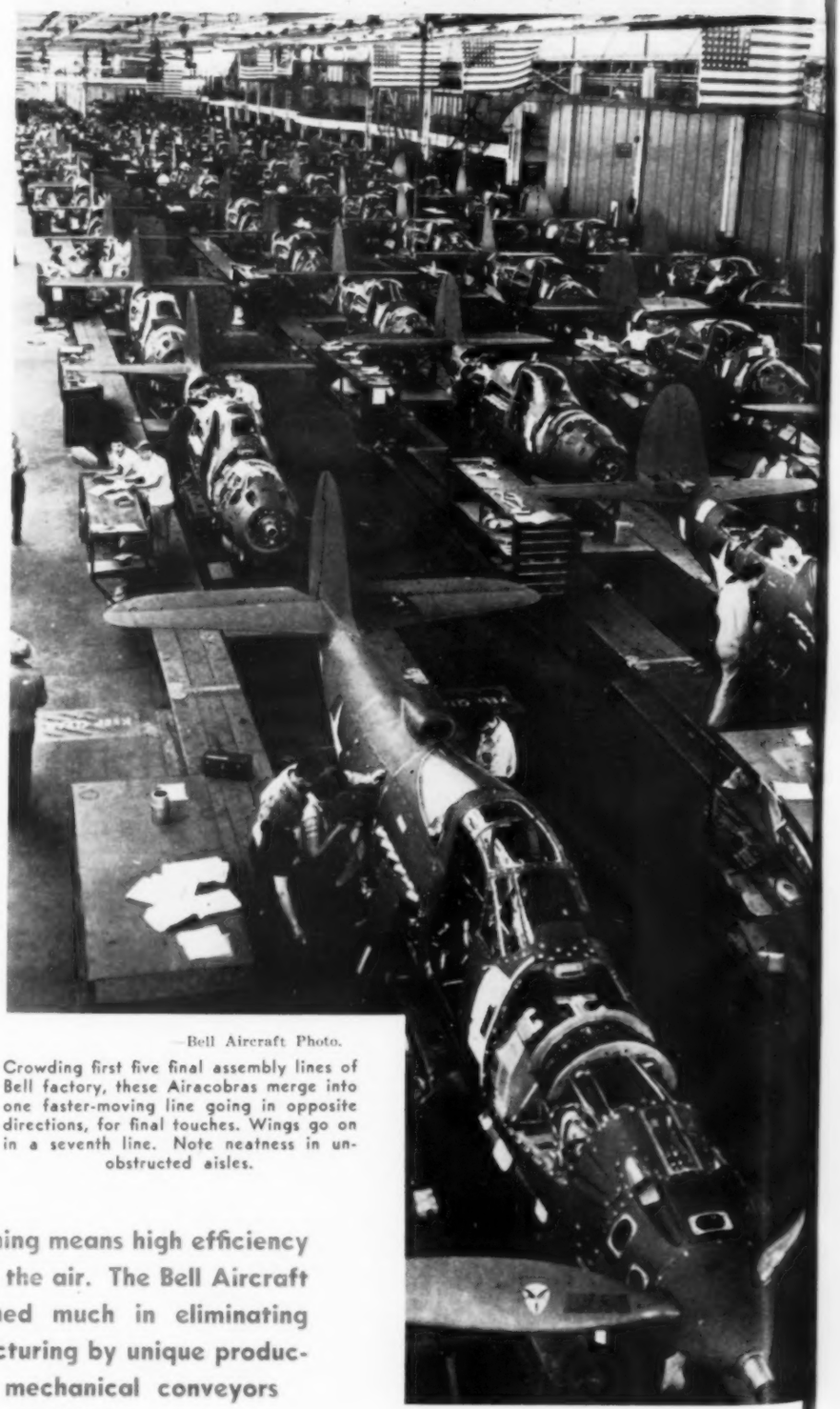
To streamline the plane, the liquid-cooled Allison engine was placed behind the pilot, its power being transmitted to the propeller through a ten-foot drive shaft. This made possible the installation of a 37-millimeter cannon in the nose of the plane firing through the propeller hub, two .50-calibre machine guns also in the nose, and two .30-calibre machine guns on each wing. At the same time it permitted the use of a tricycle landing gear to provide good landing and ground characteristics.

Many Conveyors Used

To streamline production, the flow of materials was planned so that stock would travel as little and as smoothly as possible en route from first tooling to final assembly. Parts move directly from one station to the next, and mechanized assembly lines and conveyors are used to an unusual extent for an aircraft company.

Bell makes almost all the parts of the Airacobra, except for the tail section. The old factory in Buffalo, originally built for Curtiss during the last war, is now used as a parts plant, while the new plant, sixteen miles away in Niagara Falls, is the assembly plant. Together they form the Niagara Frontier Division.

Compact is the first adjective to describe the two factories, and clean is the second. Everywhere machines and jigs have been crowded together without creating the slightest confusion among the workers. The men and



—Bell Aircraft Photo.

Crowding first five final assembly lines of Bell factory, these Airacobras merge into one faster-moving line going in opposite directions, for final touches. Wings go on in a seventh line. Note neatness in unobstructed aisles.

With Airacobras, streamlining means high efficiency in the factory as well as in the air. The Bell Aircraft Company has accomplished much in eliminating waste and drag in manufacturing by unique production methods, utilizing mechanical conveyors wherever possible.

women janitors keep the plants well swept at all times, and other women even take vacuum cleaners to the planes on the assembly lines.

In its Niagara Falls plant Bell installed one of the first powered assembly line systems in the country. Today there are seven of these lines, literally packed together. Most of the work is done on the first five, which are a little shorter and move more slowly than the other two. As the planes reach the end of these lines, they are taken off and sent back on the sixth line, where odd jobs which were missed on the way down are finished.

During all this time, however, the planes have been without wings in order that the assembly lines could be as near together as possible. Finally, like graduating fighter pilots, they receive their wings on the last lap as they move down again and out of the factory on the seventh line.

Mechanized Wing-Assembly Line

Adapting the same production methods for building wings, Bell has introduced five more parallel lines into the Buffalo plant—the only mechanized wing-assembly lines in the country. Here, too, the most is made of every square inch of space. The jigs are attached to the lines so that the wings move lengthwise, and the lines are placed close together.

All the wings are started on the first line, a nucleus of the leading edge, main beam and spindle bearing being formed there. Then they are removed to one of the other four lines, moving in the opposite direction, two of which are for left wings and two for right wings. As the wings are built from the leading edge up, benches first of one level and then of a higher level are set up along the lines for the workers to stand on after the center section and trailing edge have been added.

The lines are used both for fabrication and for assembly. In spite of the mechanization of the wing assembly, the wings are not mass-produced but rather custom built. In fact, Bell makes its wings much as a tailor makes a suit. The engineering is taking the measurements and making the pattern; the work in the shop, where the parts are cut, shaped and tooled, is the cutting; and the assembly is the sewing. Or perhaps the work may be compared even better to dressmaking, for 85 per cent of the workers on the wing assembly are women.

Just a suit or dress still has much work to be done on it after the first basting, so the wing parts still have more work to be done on them in the assembly room. As at a fitting where the length of the sleeves and the location of the buttonholes are marked off, so here the parts are fitted to the wing and the rivet holes marked off and drilled. Then they are disassembled, dimpled, chromated and inspected. Finally they are reassembled and the actual riveting done, like the final stitching on a suit.

The newest of Bell's mechanized innovations is an ingenous conveyor system, which takes parts of almost any size through a complete paint job. The parts arrive at the paint shop just as they leave the machines—with dirt, grease and metal filings clinging to them. The girls who man this department attach the parts by hooks to large racks and place them on a powered conveyor. From there on the work is all mechanical.

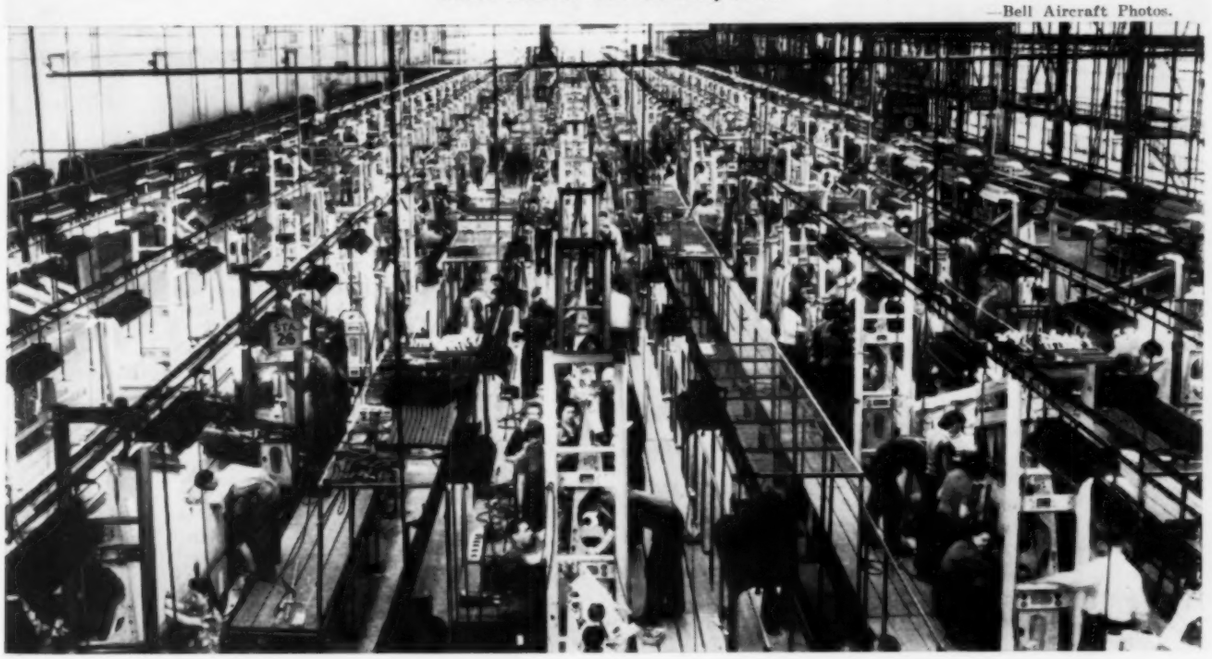
The first conveyor puts the parts in succession into a de-greasing tank, two clear water rinses, a chromic acid dip, and another clear water rinse, and then drops the racks onto another conveyor. The second line takes the racks through a drying station and in turn hands them on to a third conveyor. This last line carries the parts down into a large tub of zinc chromate paint, which is automatically stirred before each dipping; brings them up and out again into another drying station; and finally deposits them on a truck which is waiting to carry them off to subassembly stations.

No Congestion in Aisles

Both of the Niagara Frontier plants make great use, too, of overhead con-

Wings for Airacobra are tailor made with both fabrication and assembly being done on the nation's only mechanized assembly line for wings. Grids between platforms serve both as guard rails and as convenient parts racks. All electric and air-operated tools are suspended from automatic reels, remaining at whatever height released. Cabinets at end of each station hold all other necessary tools.

—Bell Aircraft Photos.



—Bell Aircraft Photo.

Fuselage for P-39 can be turned on its side, while moving down assembly line, to facilitate work. Assembly starts with the fuselage, then nose and next tail, with wings attached last to conserve space.

veyors to avoid congestion in the aisles. In Buffalo there are two such conveyors, one for fabrication and another for assembly. At the Niagara Falls plant, in addition to a complete overhead conveyor system for supplying the assembly lines with parts, there are a number of mechanized hoists for moving large subassemblies. The engines, for instance are carried to the lines by hoists and installed into the plane from above—a very delicate operation, which must be performed at an early stage of the assembly, contrary to the usual procedure because of the location of the engine in the middle of the plane.

For the acetylene welding in the parts plant, Bell pipes in the gases from an outside storage tank. This does away with the necessity of having to bring in new tanks through the plant all the time and has the added advantage of keeping the high pressures maintained on the gases outside of the plant. As a safety measure, the aceylene pipes are painted red, the oxygen pipes green, and the hydrogen pipes yellow.

Another way in which the company has helped to keep the aisles clear, and also to save time and manpower, is by installing mechanized letter carriers in both plants. These are pneumatic chutes, much like those used in department stores, which carry orders and sometimes even small parts from one department to another in cylindrical boxes about a foot long. To avert traffic jams during changes of shifts and lunch hours, there is an underground tunnel in the Niagara Falls plant so that the workers can go directly from their own departments to the parking lots or the cafeteria.

Just as the aircraft engineers are continually introducing improvements into the Airacobra, so other engineers are continually introducing new time-saving machinery into the plants.

A pantograph machine, for example, was developed several years ago by Bell engineers for cutting and drilling metal parts. Fundamentally it consists of two blades which move parallel to each other, one tracing the pattern from a templet and routing the other which actually cuts the parts. In addition, there are two drills, one at each end of the pantograph table. The great advantage of the machine lies in the fact that it not only can cut several layers of parts but can also perform a variety of operations at one time. Moreover, it can be kept in constant use, the workers loading it with templets and parts at one end while the machine is in operation at the other.

Another famous time-saver introduced by the company is the Farnham milling machine, especially designed according to Bell specifications, for machining wing spars. A more recent innovation is a friction cutting machine which cuts not with a sharp edge but with heat, allowing the workers to cut heavier metals and to do more operations.

Among the hydraulic presses for shaping parts is one large 5,000-ton press, operated entirely by women. In perpetual motion it is fed by four tables, sometimes stamping out as many as ten parts at once. There are six girls to a table and two to operate the machine. The tables move into position in front of the press on rails, the girls standing on a kind of running board and moving with the tables so that they can start unloading one set of parts and reloading another as soon as possible after they have come out of the press. Incidentally, Bell has a plaster department for making its own dies.

To simplify the work throughout both plants, Bell uses the lofting system, whereby a full-scale model of each part is made for the employes to work from rather than from a blueprint. The only people in the company who have to read blueprints, therefore, are the inspectors, and even some of them work with metal templets instead.

In the offices as well as in the plants there is a minimum of waste and drag. Everywhere one gets the impression of quiet efficiency, for production at Bell, like the Airacobra which it builds, is streamlined.

More Airplanes, Less Manpower

As examples of efficient labor utilization, the Aircraft War Production Council cites these statistics on the numbers of craftsmen necessary to build three types of airplanes now in combat all over the world:

1. *An Attack Bomber*—For every 100 men required in October, 1940, only nine were required in July, 1943.
2. *A Fast Interceptor* — For every 100 men required in October, 1940, only five were required in July, 1943.
3. *A Medium Bomber* — For every 100 men required in October, 1940, only ten were required in July, 1943.

Other models show a similar trend toward increased output for manpower, although no constant ratio of increase can be established among the various types of airplanes due to design and equipment changes tailored to each individual fighter or bomber, the Council added.

BOOK REVIEWS

God Is My Co-Pilot, *by Col. Robert L. Scott, Jr., published by Charles Scribner's Sons, New York, price $2.50.*

The first writing to do justice to the tactical brilliance of Major General Claire Chennault and his pilots, this book provides, as no other attempt has achieved, the most faithful and authentic account of valiant American air war being waged against the Japs from China. It is primarily about pilots in general and Pilot Scott in particular, and as such should inspire (as General Chennault says) every American boy.

From it we gain more appreciation than ever of the oft-maligned P-40. Seven of the Curtisses on one occasion (Oct. 25, 1942) escorted fourteen medium bombers to Hong Kong and, jettisoning their improvised little belly tanks of bamboo, shot down nineteen Zeros and Messerschmitts which attacked them. Again, on Nov. 27, twenty-two P-40's engaged forty-five Zeros over Canton and knocked twenty-nine of them from the sky. At Yeching, on Dec. 26, a Jap raiding force of nineteen fighters and heavy bombers was completely annihilated by fourteen P-40's.

About Chennault: "As I took my formation into the air and followed out the instructions the General had given me, I realized that for all practical purposes he was in the fighter with me; I was merely privileged to press the trigger and send the enemy into the ground and destruction. Yes, the General rode with me on those flights in more ways than one."

A brief but significant foreword written by General Chennault carries this stirring message to America: "The results which they (his pilots) achieved prove indisputably that the enemy can be destroyed or driven from China if adequate equipment and supplies are made available. . . . They impatiently await the weapons needed to drive on into the heart of Japan and to final victory."

The Lady and the Tigers, *by Olga S. Greenlaw, published by E. P. Dutton & Co., New York, price $2.50.*

The wife of one of Major General Claire Chennault's former staff officers wanted, apparently, to flavor the tales of the Flying Tigers by injecting her "woman's angle." The result of her labor is a hodge-podge build-up of herself, often told at the expense of the AVG pilots, amongst whom she lived.

The Navy Has Wings, *by Fletcher Pratt, published by Harper & Brothers, 49 East 33rd Street, New York, N. Y., price $2.75.*

Written by Fletcher Pratt, a famous naval expert, this book encompasses the complete story of the naval air service — from selection and examination of the prospective naval flyer, through pre-flight training, flight training, specialized training squadrons into actual combat.

While the book is predominantly concerned with the naval flyer—his training, ability, and personal thoughts and life, the various phases of the Naval Air Arm are reviewed. The lighter-than-air craft, their development, purpose and uses, land bases and carriers all receive attention. Pratt explains the interdependence of the air arm and the fleet and their operations together.

In addition to the numerous personalized stories, the book is illustrated with thirty-four official Navy photographs.

Field of Action of Aircraft, *by W. W. Smith, published by Jardur Import Co., 874 Broadway, New York City, price $1.50.*

This booklet is based on the discovery of a new method of solving all radius of action problems, so simple in application, that under any given set of conditions a determination can be made for all directions of flight from the base in a few minutes. This total determination is called the "Field of Action."

The matter is presented in logical order and clear, concise form. Pilots and navigators will find that the principles involved are easily grasped and can also undoubtedly be applied to many problems in addition to those given.

The booklet contains sixty-four pages, is profusely illustrated, and has a flexible strong paper cover for easy carrying.

Hurricanes: Their Nature and History, *by Ivan Ray Tannehill, published by Princeton University Press, Princeton, N. J., price $3.50.*

This book contains in brief form all the information known about hurricanes, particularly in the West Indies, United States, the Gulf of Mexico and Caribbean Sea. Written in popular form, it is intended for all persons who may run the risk of hurricanes. The reader may discover the nature of a tropical cyclone, then a historical account of reference to every hurricane known to have visited the locality in which he may be interested.

America's Fighting Planes in Action, *by Reed Kinert, published by The Macmillan Company, 60 Fifth Avenue, New York, price $2.50.*

This book, written and illustrated by Reed Kinert, contains dramatic drawings, many in full color, with accompanying texts of the characteristics and use of all American military planes in action today.

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Executives Report to Washington as Aircraft Production Levels Off

The aircraft production curve has flattened out and manpower is the chief obstacle to meeting schedules which call for an additional 28 per cent increase on already expanded output by December 31.

With this fact in mind, aviation manufacturing executives met with high Army and government officials late in September in Washington to go over manpower problems facing the industry. Those going East from the West Coast were P. G. Johnson, Boeing; T. M. Girdler and C. T. Leigh, Consolidated Vultee; Donald W. Douglas and A. M. Rochlen, Douglas; Cyril Chappellet, Lockheed-Vega; Leonard K. Schwartz, Lockheed; J. H. Kindelberger, North American; LaMotte T. Cohu, and T. C. Coleman, Northrop, and T. Claude Ryan and W. Frank Persons, Ryan. They are also scheduled to meet jointly with officers of the Aircraft War Production Council, East Coast, Inc., who traveled some time ago to the West Coast for a meeting there.

Martin Develops Rubber-Like Plastic of Vinyl Type

A new material described as superior to natural and synthetic rubber has been announced by the Glenn L. Martin Company. The new elastic-plastic, known as Marvinol is a vinyl-type plastic and not a synthetic rubber, Martin emphasized, and elimination of the vulcanization process and its thermoplastic nature account for its 100 per cent reclaimability. Inner tubes for automobiles can be fabricated more easily from Marvinol than rubber, and because of the impermeability of the elastic-plastic, seepage of air through the side wall of the tube is eliminated, Martin stated.

The manufacturing process of Marvinol is less complicated and expensive than those of synthetic rubbers, and the new materials can be processed on standard rubber-working machinery.

Developed in the Martin Plastics Research Laboratory by Clayton F. Ruebensaal and Earl H. Sorg, Marvinol has been thoroughly tested in the laboratory and in actual performance.

Army Contracts for Large Numbers of Waco Gliders

According to the Waco Aircraft Company of Troy, Ohio, designers of the fifteen-place CG-4A cargo glider, several new military contracts for increased glider production have recently been issued. Waco itself received an order of about $13,000,000 for CG-4A's, Commonwealth Aircraft, Inc., has received a $15,000,000 order for the same model, and the Ford Motor Company has received a $31,000,000 CG-4A contract.

Coast Reports Decline in Employment; Only 20,000 of 150,000 New Hires Stay on Job After Training

While conferences and surveys continued to seek solutions to West Coast manpower shortage problems, Pacific Coast aircraft plants last month reported a decline of 2.7 per cent in total employes between July and August —and their combined working force was 20,000 workers short of scheduled operations three months ago. Moreover, of 150,000 workers hired during the first six months of 1943, only 20,000 stayed on, while the rest "disappeared" in the perplexing turnover which is plaguing the Coast.

Aircraft production has increased, the companies report, a total of 4,260 per cent by weight since January, 1940. But employment has increased only 933 per cent. The rate of increase is insufficient to meet greatly accelerated schedules for the rest of this year and 1944—particularly in new combat models now going into production.

Selective Service, unless blanket deferment is authorized, is expected to take from the Coast plants a total of 58,000 workers by June, 1944, says the Aircraft War Production Council. Of these, 37 per cent are in engineering, 24.3 per cent tooling, 23.2 per cent inspection, 17.1 per cent plant and 15.8 per cent administration.

The Council, concluding an extensive study of the problems, has recommended government action to (1) provide an effective method of stopping turnover and requiring employes to remain on the job, and (2) provide group deferment by Selective Service to "key" men. Pending government action to clarify the manpower situation, the Council has recommended the following immediate remedial steps: (1) increased out-of-state hiring, (2) adequate provision of payment for transportation of workers from surpus labor areas to critical labor areas, (3) guarantee of adequate housing for immigrant workers, (4) co-operation of government and educational authorities to stimulate maximum employment of youths sixteen to eighteen years old, (5) enforcement of WMC Availability Certificate procedures to restrain labor turnover, (6) liberalization of Selective Service deferments of "key" men.

NAA's Kansas Plant Builds More Medium Bombers Than Any Other Factory in U. S.

The Kansas plant of North American Aviation will have produced more medium bombers in 1943 than any other plant in the nation, J. H. (Dutch) Kindelberger, president of the company, predicted recently. The plant produced five times as many airplanes in May, June and July of 1943 as it did for the same period of 1942, and in December, Kindelberger anticipates the total 1943 production will carry the same 5-1 ratio to 1942 production. The Modification Center has modified and put into service almost as many B-25s as the total quantity of all types of military airplanes produced annually in the country a few years ago. Although the Center now employs as many persons as the entire NAA organization employed four years ago, plant personnel will have to be increased by 5,000 this year, and the plant will hire 14,000 persons to gain 5,000 if this present manpower turnover rate continues, Kindelberger added.

100,000th "Wasp" Delivered by Pratt & Whitney

Shipment of the 100,000th "Wasp" engine produced in Pratt & Whitney Aircraft Division of United Aircraft Corporation was made recently, with Army and Navy personnel participating in the ceremony. The first "Wasp" engine, passed by the Navy in 1925, examples of the seven current production engines and planes powered by the Pratt & Whitney engines were displayed. The double Wasp 100,000th engine was constructed in the East Hartford plant of components machined there and in five other plants. Hundreds of subcontractors and vendors furnished a share of the 10,000 parts in the engine.

Buick Expands Output of Pratt & Whitney Engines

Production of 1,200-h.p. Pratt & Whitney aircraft engines by the Buick Motor Division will be increased by 36 per cent during the last quarter of 1943. Schedules call for a volume near three times larger than that of the year's first quarter.

Convair Discontinues Modification Operation at Texas Plant

The Fort Worth division of Consolidated Vultee Aircraft Corporation has discontinued modification of B-24 Liberator bombers in order to meet accelerated bomber and transport production schedules, Division Manager George J. Newman announced recently. Modification of Liberators produced at Fort Worth will be done at Louisville, Ky., and Tucson, Ariz. The Fort Worth plant has met or exceeded its production schedules each month for the past year, while modifying almost 1,000 Liberators, Newman stated, but increased production quotas made discontinuance of modification necessary.

Annual SAE Aircraft Meeting Held in Los Angeles

The SAE's Annual National Aircraft Engineering and Production meeting was held September 30-October 2 at the Biltmore Hotel in Los Angeles as one of a series of wartime engineering conferences on production of motorized military equipment. The conferences, sponsored by the SAE and its four Pacific Coast sections in co-operation with the Aeronautical Chamber of Commerce, Air Transport Associated, and National Aircraft War Production Council, included discussion of field maintenance, aircraft propellers and engines, power plants, accessories and aircraft production. Harry Woodhead, president of Consolidated Vultee Aircraft Corp. at San Diego, presided at the general session. Chairman of the various group meetings included: Reagan Stunkel, Lockheed Aircraft Corp., Burbank; A. L. Klein, Douglas Aircraft Co., Santa Monica; T. F. Bergmann, Wright Aero.,

Ltd., Los Angeles; C. L. Johnson, Lockheed Aircraft Corp., Burbank; Gunnar Edenquist, Kinner Motors, Glendale; A. E. Raymond, Douglas Aircraft Co., Santa Monica; John Young, North American Aviation, Inglewood; and John G. Lee, United Aircraft Corp., East Hartford, Conn.

Brewster Develops Plastic Drill Jigs, Press Molds

Plastics are being used for drill jigs and stretch press molds to speed production of Navy Corsair fighters at Brewster Aeronautical Corporation. Given an approved sample part, a drill jig fixture is made which employs a cold-cast, non-shrink, termo-setting compound by which all drill holes are precision-fixed and held to location. The idea, originated by Leonard Weiss, director of training programs for Brewster, has speeded production and proved economical in saving war materials. An extension of the Weiss idea made possible the stretching of leading skin out of one piece of heavy duraluminum, saving many man-hours of power hammering, splicing and riveting.

New Plywood Plant

United States Plywood Corporation will probably erect a second war plant in Mexico, on the West Coast, in the state of Jalisco, following an inspection and surveying trip over Mexican timber lands for sources of supply now being made by Lawrence Ottinger, president of the company. U. S. Plywood now operates a plywood plant at Ayotla, south of Mexico City, which is manned entirely by native labor. Ottinger stated that the Mexican expansion will provide an additional source of raw materials supplies for domestic plants.

Ex-Servicemen Being Hired

Preference to qualified veterans of World War II in the employment program of Fairchild Aircraft of Burlington began several months ago, Lee H. Smith, general manager, stated recently, announcing that about 1.8 per cent of the employes at the Burlington plant are ex-service men, and that the proportion is increasing.

WMC Urges Increase in Training at War Plants

Regional directors of the War Manpower Commission have been instructed to urge managers of war plants provide more training facilities for their employes, as enrollments in pre-employment courses have steadily declined, Paul V. McNutt, chairman of the WMC, announced recently. Companies already conducting paid-trainee programs and given as examples were North American Aviation Corporation, Dallas, Texas; Boeing Aircraft, Beechcraft and Cessna Corporation, and Coleman Lamp Company, Wichita, Kansas; Consolidated Vultee Aircraft Corporation, Fort Worth; and J. A. Jones Construction Company, operating programs in forty-two centers in six Southern states.

Mexican Air Routes Doubled, Traffic Expanded

Mexico's civil aviation routes have more than doubled in length and traffic has increased to an even greater extent, according to General Alberto Salinas Carranza, chief of the Department of Civil Aeronautics of Mexico. He cites better maintenance and greater use of equipment. A large part of the Mexican aerial traffic consists of moving coffee, chicle, and mineral concentrates, he stated. Mexico's commercial airlines operate only within Mexico, with the exception of one route to Los Angeles and one to Havana.

Economic Problems of Aircraft Industry Are Tackled by Aero Chamber

Plans for intensified teamwork within the industry and between the industry and the government were formulated last month by the Economic Development Committee of the Aeronautical Chamber of Commerce at a meeting in Colorado Springs, Colo., attended by seventy-five aircraft executives. Sol Voorhes, assistant to the president of Lockheed Aircraft Corp., was elected chairman, and Irving H. Taylor of Douglas Aircraft Company was named vice chairman.

Major problems presented as needing immediate attention included renegotiation and termination of military contracts, and use and disposition after the war of surplus plants, airplanes and aviation products. A working group of fifteen members was created under the name of "Economic Development Council" with Voorhes as chairman, Taylor as vice chairman, and the following membership: Ira J. Snader, Aviation Corp.; L. A. Hyland, Bendix Aviation Corp.; James P. Murray, Boeing Aircraft Co.; Don Flower, Cessna Aircraft Corp.; J. C. Willson, Curtiss-Wright Corp.; P. A. Hewlett, Consolidated Vultee Aircraft Corp.; Joseph T. Geuting, Jr., General Aircraft Corp.; J. Story Smith, Jacobs Aircraft Engine Co.; R. E. Davis, Goodyear Tire and Rubber Co.; L. L. Snow, Pratt & Whitney Division, United Aircraft Corp.; A. T. Hapke, Jr., Republic Aviation Corporation; Robert B. Lea, Sperry Gyroscope Corp.; and H. W. Cohu, Northrop Aircraft, Inc.; Wayne W. Parrish, editor and publisher of *American Aviation* and *American Aviation Daily*, was master of ceremonies at a banquet closing the meetings.

Switlik Wins Star

Switlik Parachute Company recently was awarded the white star for maintaining production standards for six months following their previous award of the Army-Navy "E".

Martin Develops Lightweight Plastic Flooring for Planes

A new lightweight plastic aircraft flooring, called Panelyte, has been installed on the afterdeck of the Martin Mars, and the weight-saving flooring has been made available to other aircraft manufacturers under a manufacturing license given the St. Regis Paper Company, Trenton, N. J. The plastic flooring weighs approximately ¼ lb. per square foot less than other types of flooring of equal strength and carrying capacity, and will represent a saving of 423 pounds per plane in the 50-ton flying boats. The plastic flooring, developed by George DeBell, Martin plastics engineer, is made from laminated phenolic sheet reinforced with aluminum alloy strips, and closely resembles standard aluminum decking now used by the aircraft industry. It has been made into several different weights to allow for a range of applications including catwalks, benches, tables and passenger compartment flooring. A pound of weight saved is worth $500 to an airline operator over the lifetime of a plane.

Engineering Staff of Hamilton Standard Reset

Hamilton Standard Propellers, a division of United Aircraft Corporation, reorganized its engineering staff to handle the introduction of new propeller developments and models into limited and general production, it was recently announced. In addition it will utilize added facilities made available by the recently completed test house office and temporary office building. Five assistant engineers were promoted under the new setup. Edwin D. Eaton became administrative engineer; Murray C. Beebe, chief development engineer; Thomas B. Rhines, chief production engineer; Glenn T. Lampton, chief experimental engineer, and Charles M. Kearns, Jr., chief research engineer. Charles B. Conwell, former project engineer, is now senior engineer, and Erle Martin is engineering manager.

Ryan Heads Aircraft War Production Council

Ryan

T. Claude Ryan, president of Ryan Aeronautical Company, last month was elected president of the Aircraft War Production Council, Inc., succeeding LaMotte T. Cohu, chairman of the board of directors of Northrop Aircraft. Courtlandt S. Gross, president of Vega Aircraft Corporation, was elected vice president of the Council. Aircraft War Production Council member companies are Boeing, Consolidated Vultee, Douglas, Lockheed, North American, Northrop, Ryan and Vega.

Bell Leads East Coast Aircraft Production Council

Lawrence D. Bell, president of Bell Aircraft Corporation, was recently elected president of the Aircraft War Production Council, East Coast, Inc., in New York, succeeding J. Carlton Ward, Jr., president of Fairchild Engine and Airplane Corporation. Other East Coast Council officers elected were L. C. Goad, vice president of General Motors Corp., and general manager fo GM's Eastern Aircraft Division, vice president; Ken Ellington, secretary, and Francis T. Boyd, assistant treasurer. C. M. Vandeburg is general manager.

The boards of directors of the East Coast and West Coast Aircraft War Production Councils are scheduled to meet jointly in New York during October to discuss manpower, materials, and other problems confronting the industry.

Engineers Meet in Dallas

Process engineers for various aircraft companies at Dallas, Fort Worth, Kansas City, Louisville, St. Louis and Nashville met for a three-day conference in Dallas during September. R. B. Jackson, process engineer with North American Aviation in Dallas, was in charge of arrangements for the conference.

Schools Draw 1,500 Workers from Boeing

Boeing Aircraft Company recently lost the majority of 1,500 students and teachers who worked during the summer months building Flying Fortresses. Last June Boeing offered vacation jobs at regular factory wages to boys sixteen years of age or more and girls seventeen and up. For their summer's work the majority received over $500 apiece.

AIRLINES

Use of Flying Schools' Pilots for Feeder Lines Proposed in Southeast

Contending its parent company's Army flying training facilities, including 250 pilots with an average of 1,174 flying hours each, can be effectively adapted to postwar feeder airline operations, Southeastern Air Express, Inc., of Atlanta, Georgia, has applied to the Civil Aeronautics Board for feeder routes totalling 4,100 miles in eight Southern states. Nine flight divisions would be Atlanta-Memphis, Atlanta-Tallahassee, Atlanta-Florence, Savannah - Raleigh - Savannah, Savannah - Jackson, Nashville-Savannah, Memphis-New Orleans, Atlanta-Pensacola and Columbus-Jacksonville. Twin-engined equipment was proposed for routes where passenger traffic proved justifiable, with single-engined craft for mail and cargo runs. Ninety-one cities would be served. Southeastern Air Express, Inc., is a subsidiary of Georgia Air Service, Inc., of Atlanta, which operates AAF Flying Training Detachments in South Carolina and Tennessee. H. T. Dobbs of Atlanta is chairman and E. Cody Laird of Atlanta is president.

Air Pick-up Surveyed for Possible Expansion

As a result of requests from communities all over the country for direct air service, the Civil Aeronautics Board recently ordered an investigation of air pick-up, local and feeder service. Hearings in the investigations opened in Washington in September. Being studied is All American Aviation's feeder operations embracing five routes radiating from Pittsburgh to 116 communities in Pennsylvania and five adjacent states, with station points an average of seventeen miles apart, and service provided from two to four schedules daily.

Airlines Plan Service to 3,000 American Cities

Plans to extend air transportation after the war to more than 3,000 cities in United States have been completed by the sixteen domestic airlines comprising the Airlines' Committee for United States Air Policy, Carleton Putnam, president of Chicago and Southern Air Lines and member of the policy committee, announced recently. The plans for domestic airline expansion are correlated with the outline of policy on postwar international aviation recently filed by the same companies with the Civil Aeronautics Board. Their domestic and foreign facilities would be interdependent and expanded simultaneously, Putnam emphasized. Expanded air fleets available to the airlines after the war, the companies' wartime experience in flying tens of thousands of route miles overseas, increased aircraft production, and 2,000,000 service men trained in aviation to be absorbed in civilian aviation, will make such vast postwar plans practical, Putnam stated.

Colombian Growth Reported

Figures on commercial air transport operations in Colombia, as announced by the government, show airlines there in the last ten years carried 421,441 passengers and 41,402 tons of freight, with a total of 17,100,000 air-miles logged. In 1941, the figures were 58,720 passengers, 6,389 tons of freight and 2,010,000 miles of airline operations

New Routes Sought By Many Airlines

BRANIFF AIRWAYS, INC., has applied for new international routes totalling 19,719 miles and linking Mid-American cities it now serves with nine European capitals and eight South American centers. The application follows Braniff's recently-concluded financing program creating a total capital and surplus of over seven million dollars. The new international routes would extend from (1) Houston to Buenos Aires and Rio de Janeiro via Merida, Balboa, Bogota, Guayaquil, Lima, La Paz and Asuncion, (2) Houston to Balboa via Havana, Kingston, San Juan, Port of Spain, Maracaibo and Barranquilla, and (3) Dallas to Europe via Atlanta, Charleston, Hamilton (Bermuda), Azores, Lisbon, and Madrid, with service to Rome extending from Madrid through Barcelona, Marseille and Genoa, and service to Stockholm (with a branch going to London from Paris) via Paris, Berlin, Copenhagen and Oslo. Braniff recently filed an application for an extension to New York from Chicago via Detroit.

CHICAGO AND SOUTHERN AIR LINES has applied to the Civil Aeronautics Board to extend its facilities to nineteen cities in eight states. New routes appiled for include two routes between Minneapolis-St. Paul and Chicago; two routes between Chicago and Detroit; a route between Kansas City, Mo., and Jacksonville, Fla., and an alternate route between Memphis and Chicago.

Application to operate trunk-line service to ninety-five cities from coast to coast was made by TRANSCONTINENTAL & WESTERN AIR, INC. The plan for development links ninety-five new cities with twenty-eight cities already served in new routes paralleling TWA trunk-line routes. Trunk-line and local service lines would serve all communities with one flight direct, another flight local.

WESTERN AIR LINES has applied for a route to link major West Coast cities with Anchorage, Alaska, via Ketchikan and Juneau, Seattle, Portland and San Francisco. Western recently was granted a non-stop route from Los Angeles to San Francisco, and another application is filed with CAB for extension from San Francisco to Seattle.

Service to dozens of cities in New York, New Jersey, Pennsylvania, Virginia, Connecticut, Massachusetts, Rhode Island, Ohio, Michigan, Illinois, Wisconsin, Minnesota, Indiana, West Virginia, Kentucky, Maryland, Tennessee, Alabama, Louisiana, North and South Carolina, Florida and Georgia, has been applied for by PENNSYLVANIA - CENTRAL AIR LINES. Direct flights between major cities in each state is planned with 100 other cities in intermediate points served by the main line service.

An application filed by UNITED AIR LINES asked for a new air route from Chicago to Detroit, Newark-New York, with non-stop flights from Chicago to Detroit and from Detroit to Newark-New York, and non-stop flights from Chicago to Detroit with stops eastward to Newark-New York.

MATSON NAVIGATION COMPANY has filed to operate four air transport services from Seattle, Portland, San Francisco and Los Angeles to Hawaii over its steamship routes in this area.

TWA Award Winners

Winners of the sixth annual Transcontinental & Western Air, Inc., aviation writing and photo competition have been announced as follows: Magazine division—Max Karant *(Flying)*, E. J. Foley *(American Aviation)*, Selig Altschul *(Barron's)*; newspaper—Robert S. Ball (Detroit *News)*, Scholar Bangs (Los Angeles *Examiner)*, R. M. Cleveland (N. Y. *Times)*; newspapers of less than 100,000 circulation — Alexander McSurely (Dayton, Ohio, *Journal-Herald)*, Nick Moser (Reading, Pa., *Eagle-Times)*, Helen Waterhouse (Akron, Ohio, *Beacon-Journal)*; photographic—William W. Dyviniak (Buffalo *Courier-Express)*, W. E. Loeber (Pittsburgh *Sun-Telegraph)*, Robert Seelig (N. Y. *News)*.

Air Express Gains Cited

Commercial air express passed its sixteenth year this September with a growth from 17,000 shipments in 1928 to more than 1,405,000 in 1942, Ben E. Sherwood, American Airlines' superintendent of air mail, express and freight, stated recently. During August, American Airlines increased express poundage by 67.3 per cent, air mail by 92.1 per cent, and average payload by 13.8 per cent over August, 1942. Commercial airlines' gross revenues from air express exceeded the million-dollar mark for the first time in April, Sherwood added.

AIRLINE PERSONALS

J. FRANCIS REILLY, formerly Civil Aeronautics Board Examiner, has been appointed executive assistant to CAB Chairman L. Welch Pogue, succeeding ROBERT B. BIAS, who resigned recently. . . . H. DANFORTH STARR has been appointed assistant to the president of Northeast Airlines, Inc., in charge of postwar planning. Starr was formerly associated with the National Aviation Corporation and the Federal Reserve Bank. . . . RAY W. WELLS, Eastern Division chief pilot for Trans-Continental & Western Air, Inc., has been named superintendent of the newly created Midwest Division of TWA in Kansas City. . . . RUSSELL J. SMITH, former system reservations manager for Western Air Lines, has been appointed superintendent of passenger service for Western at Burbank, succeeding HUGH COBURN, who resigned to join Mid-Continent Air Lines as general traffic manager in Kansas City. WILLIAM KERRIGAN, formerly manager of passenger service in Salt Lake City, will assist Smith. . . . ALLISON M. BERRY, formerly manager of the trading department of Robert Garrett & Sons who, when he joined Pennsylvania-Central Airlines' navigation school last November, had never been in a plane, is now a flight instructor for Army officers and Air Transport Command personnel in navigation at PCA's school. . . . R. A. MERKLE, assistant district traffic manager of United Air Lines in New York, has been appointed district traffic manager of Colonial Airlines in New York. Merkle is co-author with C. E. HALL of a book on air transportation entitled, "The Sky's The Limit", recently published by Funk and Wagnalls Company.

NEW PRODUCTS

Resonance Meter for Airport Use

A new resonance meter known as type MW-60, has been developed by the Erco Radio Laboratories, Inc., Hempstead, N. Y., and is available now. The indicator was designed to determine resonance in oscillators and transmitters, standing wave ratios, transmission lines, antenna systems, tank circuits, coupling devices and modulation indication. It is especially recommended by Erco for use in field and laboratory in measuring transmitting equipment on absolute altimeters, blind landing markers, glide path markers, airport traffic control, weather teletype and broadcast relay circuits.

Portable Spark Plug Testing Unit

Developed by the Airplane Manufacturing and Supply Corporation, is a portable spark plug testing unit to test and overhaul BG, Aero, Bendix and A. C. aircraft spark plugs in the field or shop. The cabinet, including tools, weighs eighty-four pounds and is twenty-six inches wide, twelve inches deep, and nineteen inches high. It is operated by a one-eighth h.p. electric motor, has a hand crank for use when 110-V power is unavailable, and a hand pressure test bomb to supplement C02 supply. It also has a point setter electrode adjuster.

New Thickness Planer

A new twelve-inch by four-inch thickness planer has been produced by the Boice-Crane Co., Toledo, Ohio. It is designed to plane the hardest, "splintery" varieties of woods down to veneer-like thickness, ready to finish without sanding, and using stock as short as six and one-half inches. Bench or floor type models can be had in a choice of drives, direct to cutterhead, V-belt electric motor drive, or drive from lineshaft or gasoline engine.

Lightweight Solenoid by Adel

Adel engineers announce a new solenoid operated fluid shut-off valve which weighs only 6.96 ounces. The new valve was designed for the remote control of anti-icing fluid flow to various critical parts of the plane. It may be used in the ice protection of propellers, windshields, bombardier windows, carburetors and pilot tubes, or in systems such as heater fuel or oil dilution control, lavatory and drinking water control in commercial planes. The valve has a Dural body, is equipped with standard AN 3102-8S-1P receptacle and may be had in port sizes for one-eighth-inch pipe threads or one-fourth-inch tube fittings. Installation may be planned for any operating position. Current .25 amps., 24 volts DC. Units are available for working pressures of fifty psi and 250 psi.

New Line of Standard Thread Cutters

Designed to speed delivery and simplify ordering of multiple thread milling cutters, Detroit Tap and Tool Co., of Detroit, Mich., has developed a line of standardized thread milling cutters. The blanks are carried in stock at Detroit Tap, finish machined and heat treated, ready for finish grinding of threads. They will continue to carry the special size thread milling cutters which cannot be met with the new "standard blanks".

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APMA Adds New Members

The Aircraft Parts Manufacturers Association recently admitted fourteen California companies as new members. They were listed by C. C. Codding, general manager, as follows: Aircraft Components, Inc.; H. W. Loud Machine Works; Littelfuse, Inc.; J. H. Bender Equipment Co.; Burridge & Son; General Controls Company; The Weatherhead Company; Bakewell Aircraft Products; Fog Nozzle Company; National Heat Treating; The Parker Appliance Co. (Pacific Branch); United Tool & Manufacturing Co.; Vaidaphone Company; and Weber Showcase & Fixture Co., Inc.

U. S. Safety Program Opens

Safety training courses in war plants for 625,000 foremen have begun under the direction of some 40,000 war plant supervisors who have completed college industrial safety courses, Secretary of Labor Frances Perkins announced recently. The Labor Department's division of labor standards has prepared outlines, guides and text material to supplement the in-plant courses, and consultation service is offered to smaller war plants by agents of the Department of Labor. Over 10,000 plants serviced by these agents last year showed an accident reduction in 66 per cent of the cases, saving a million man-days. Information about the free supervisory training courses may be obtained from the Division of Labor Standards, U. S. Department of Labor, Washington, in a leaflet, "What Would You Pay for 8,000 Years' Experience?"

STEEL RULE Dies SINCE 1900

SPEED AND ECONOMY

We Are Making Dies for Many of the Leading Airplane Plants.

For Cutting Everything — Even Wood

J. A. Richards Co. Kalamazoo, Michigan

Adel Opens Seattle Office

Adel Precision Products Corporation has opened a new engineering service office at 1411 Fourth Avenue Building, Seattle, Washington, H. Ray Ellinwood, president, announced recently. Lewis J. Horvath will service hydraulic customers in the new office, and Jack P. Horning will maintain contacts with line support accounts. The Seattle office will serve Boeing Aircraft of Seattle and Canada and plants in Washington and British Columbia. Adel now maintains service offices in Burbank, Dallas, Detroit, Dayton, Huntington, W. Va., Hagerstown, Md., and Toronto, Ontario.

Ryan Institute Elects Three New Directors

Ryan Aeronautical Institute, affiliate of the Ryan School of Aeronautics, expanded its board of directors from five to seven members recently. Joel M. Whitney, dean of the Institute; Samuel Lipsett, supervisor, and George Woodard, secretary of Ryan Aeronautical Company, were elected new directors. T. Claude Ryan, president, and Earl D. Prudden, vice president of Ryan School and Ryan Company, were re-elected to the board, as were Colin A. Stillwagen, and William Wagner, public relations director for Ryan School and Ryan Company. The board had functioned with one vacancy since the resignation of Gordon Brown as director last year.

New Grinder Firm

J. W. Boening and W. J. Phelan have established in Los Angeles the Accurate Machine Products Co., to manufacture the I-G-C countersink relief grinding fixture, formerly produced by the Industrial Grinding Company. The grinder fits any standard machine and will take work from one-sixteenth-inch to one inch in diameter. For many aircraft and ordnance manufacturers it has been the means of speeding up grinding operations as much as 300 per cent, the firm says.

Name Change for PESCO

R. J. Minshall, president of the Pump Engineering Service Corp., of Cleveland, Ohio, has announced that effective October 1, the firm's name was changed to Pesco Products Co. The change does not affect personnel or the firm's affiliation with Borg-Warner.

Atlantic Rayon Buys Flightex

Atlantic Rayon Corporation, Providence, R. I., has purchased the mill and assets of Suncook Mills, Suncook, N. H., manufacturers of Flightex fabric and tapes for the aircraft industry. The Flightex fabric and tapes will be marketed from Atlantic Rayon's Industrial Fabrics Division, 40 Worth Street, New York. Mill and sales personnel remained the same, Val Dietz, Jr., who continued as sales manager, stated.

Convair Managers Meet

Managers of the twelve divisions of Consolidated Vultee Aircraft Corporation met in Fort Worth for a two-day conference September 16-17. The managers attending, in addition to George J. Newman, Fort Worth manager, were J. L. Kelley, San Diego; C. W. Coslow, Downey, Calif.; W. R. Lawrence, Tucson; Edward Shelton, Wayne, Mich.; William Nelson, New Orleans; R. J. McMahon, Allentown, Pa.; D. C. Beatty, Elizabeth City, N. C.; Warner Jones, Louisville, Ky.; W. A. Hayward, Miami; J. W. Hennen, Nashville; and W. B. Stout, Dearborn, Mich.

Ziebarth Takes Over Morrow Aircraft Corp.

Fritz Ziebarth, head of a Long Beach construction firm, has taken over operation of the Morrow Aircraft Corporation at Rialto, Calif. The Morrow Company pioneered in the development of the "plastic" plane, having engineered the molded plywood Victory trainer from the ground up. At its plants at Rialto, Morrow is now supplying molded plywood seats, expendable gasoline tanks, rudders, and various plane assemblies to aircraft manufacturers on the East and West Coasts.

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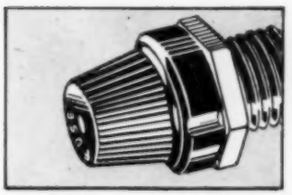
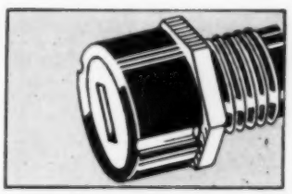
New! WELDED CONNECTION FOR GREATER STRENGTH

Cutaway of Littelfuse Extractor Post No. 1075 (for 3 AG fuses) shows welded side terminal.

Fuse can't drop out.



No. 1075-F — Finger-knob-operated.



No. 1075-S—Screwdriver operated, meeting Underwriters' specifications.

LITTELFUSE Extractor Posts

NOW Littelfuse adds welded side terminals to other exclusive factors for complete fuse extractor post service and protection: Pull-knob with specially designed grip preventing fuse from dropping out; fuse grip permitting full visual shockproof inspection; spring-activated cup insuring positive continuous electrical contact.

WELDED TERMINAL PROOF AGAINST HEAT AND VIBRATION

By the new process Littelfuse anti-vibration side terminals are mechanically connected by electric welding to the inside metal shell. Terminal and shell are made in effect one-piece—proof against heat and severest vibration.

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How this *improved* Littelfuse Extractor Post can be fitted into your products—to make better, more reliable equipment is what you want to know. Test samples are ready. Write

Extractor Posts 1075-S and 1075-F are used with 3 AG fuses (¼" dia. x 1¼" long) to 15 amps. APPLICATIONS: Radio, auto-radios, amplifiers, fractional h.p. motors, magnets, control circuits, relays, rectifiers, plate circuits, etc. Overall length 2½"; length from front of panel 2⅛"; mounting hole ½".

LITTELFUSE Incorporated

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NEW LITERATURE

Sperry Products, Inc., *1505 Willow Avenue, Hoboken, N. J.,* has released Bulletin 78-D which describes Sperry's improved Exactor Hydraulic Control. Among the advantages offered by the "Exactor" are: easy and inexpensive installation; efficient and "exact" operation; maintenance-cost-free service even after long periods of continuous use; and quick, simple relocation.

The Parker Appliance Co., *Cleveland, Ohio,* has issued a four-page folder describing the Parker Hydraulic Cable Stretcher. This stretcher is designed to fulfill the precision requirements of the aircraft industry for testing and stretching all types of aircraft cable assemblies. Complete information will be sent on request.

Harris Products Company, *Cleveland, Ohio,* recently has issued its Bulletin V-1 featuring the Duplex Vibration Insulators for mounting radios and instrument panels in airplanes.

This bulletin not only illustrates and describes the insulators but contains complete technical data to aid engineers in designing for correct installation of these insulators.

Copies of a special bulletin, "Choosing Women for War-Industry Jobs", issued recently by the Women's Bureau, U. S. Department of Labor, which includes a job analysis and placement process to fit the individual woman to a specific task, are now available from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents.

McColpin-Christie Corporation, Ltd., *4920 South Figueroa St., Los Angeles, Calif.,* has issued new illustrated catalog sheets Nos. 300 and 301 describing over fifty new models of industrial electrical rectifiers; advantages are explained and a price list is included.

United States Rubber Company, *Rockefeller Center, New York City,* announces the publication of a new booklet containing technical data and engineering information on U. S. Royal airplane tires.

Material in the catalog includes a complete description of airplane tire dimensions, tire and rim measurements, tire and tube weights, nonskid contact area figures, and maximum worn section dimensions.

The new catalog will be sent to engineers, manufacturers and operators applying on their letterheads.

The American Standards Assn., has announced publication of its new list of American Standards which will serve as a useful reference piece to the engineering and purchasing departments of manufacturng firms.

More than 600 standards are listed, ninety-four of which represent new and revised standards approved since the last (August, 1942) issue. These are marked with an asterisk.

The list is free on request to the Association at 29 West 39th St., New York City.

Tubing Seal-Cap, Inc., *Los Angeles, Calif.,* has released a four-page illustrated folder describing the Livermont Torq-Snap Wrench which is designed to apply proper torque loads without guesswork. The folder includes prices and discounts allowed.

Camloc Fastener Corporation, *420 Lexington Avenue, New York City,* has issued an eight-page illustrated folder titled, "Camloc High-Speed Fasteners." The Camloc Fastener was developed to meet the special demands of the airplane industry, and the folder shows Camloc construction, installation and specifications. All communications should be addressed to the New York Office.

Pan-American Navigation Service, *12021 Ventura Boulevard, North Hollywood, California,* recently has released a four-page folder illustrating their Air Navigation Equipment. New defense books available are also listed.

Aldine Paper Company, *373 Fourth Avenue, New York City,* has released a folder titled "Heat Slows Work," telling the story of Aldex Sweat Bands, one of the company's newest products. The back cover of the folder shows two other Aldine products—Dust Masks and Caps. Copies of the folder, together with samples of the products, may be obtained on request to the Industrial Sales Division.

(Continued on page 72)

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FAIRFAX AIRPORT Kansas City, Kan.

Navy's New Grumman Hellcat in War Zone

Grumman's big new F6F, the Hellcat, made its operational debut in the Navy's recent raid on Marcus Island, but encountered no Jap fighters. Details of the new fighter have not been released. It is believed to perform similarly to the Navy's other new fighter, the 2,000-h.p. Vought F4U Corsair.

Liquid-Cooled Zero?

Reports last month from the South Pacific told of a new kind of Jap fighter encountered near Wewak and Rabaul. It was described as having a liquid-cooled engine of more power than the radial which powers the familiar Zero.

NAA Planning Conference Set for Oklahoma City

A national aviation planning conference will be held in Oklahoma City on November 11-13 at the Skirvin Hotel, Gill Robb Wilson, president of National Aeronautic Association, announced. The conference will be open to all interests in the aviation industry, including manufacturing, operating and servicing organizations and government officials in this field, and will set up plans for establishing procedures and policies for the industry, Wilson stated.

Navy Has 18,000 Planes; In '40 it Had 1,744

The Navy last month inventoried its strength as consisting of more than 18,000 airplanes of all types and 14,072 vessels of which 613 are warships. In 1940, the figures were 1,744 airplanes of all types and 1,076 vessels, of which 383 were combat craft.

Dual Rotating Propellers Going Into Mass Production

Contracts for mass production of dual rotation propellers have been signed by Aeroproducts Division of General Motors Corporation at Dayton, Ohio, W. J. Blanchard, general manager of Aeroproducts, announced recently when the company received the Army and Navy "E" award for production achievements. Aeroproducts will use a large number of subcontractors and will go into production of the new contra-rotating propellers this winter, in addition to production of three- and four-bladed propellers.

—Fairchild Aircraft Drawing.

RANGE IN EXCESS OF 3,500 MILES is claimed for this new all-metal Fairchild transport engineered to meet present war needs for carrying guns, tanks, ammunition, supplies, troops or paratroops. Details are still secret, but Fairchild says it provides unique features for handling air cargo in postwar commerce.

"Super" Wright Cyclones To Power New Bombers

Super Wright Cyclone-18 engines will power the new bombers now being built, the AAF announced recently. The Wright engines, full details of which were not disclosed, are now in production at Wright Aeronautical Corporation, Paterson, N. J. The new super bombers, General H. H. Arnold, AAF, said in an announcement last month, will carry half a carload of bombs across the Atlantic and back home without a stop.

RotaWings, Inc., Designs 'Copters for Higgins, Kaiser

RotaWings, Inc., a newly-formed helicopter licensing and engineering concern, headed by Agnew E. Larsen, chief engineer and president of the Pitcairn-Larsen Autogiro Company, and Joseph S. Pecker, consulting engineer on mechanical apparatus, has opened offices at 1011 Chestnut Street, Philadelphia, and 200 Madison Avenue, New York. RotaWings, Inc., is associated with the engineering offices of Pecker, Simpson & Gladeck, and Machine & Tool Designing Co., Inc., engineers who recently completed the design of a helicopter for Higgins Industries of New Orleans and Kaiser Cargoes, Inc., of Fleetwings, Bristol, Pa.

Ben Stern, New CAA Director of Information

Ben Stern, recently consultant to Elmer Davis, director of OWI, has been appointed director of Information and Statistics for the Civil Aeronautics Administration, succeeding Fred Hamlin, who resigned recently. Stern, a lieutenant colonel in the Marine Corps Reserve, was detailed to the co-ordinator of information and later to the OWI as a special field representative, making special missions to South Africa, Egypt, the Middle East, Balkans, India and Pacific area. Prior to being called to active duty he was secretary to Senator Van Nuys and clerk of the Senate committee on the Judiciary. He formerly was a newspaperman in Washington, Indianapolis, Memphis and elsewhere.

Army Gets Amphibian Glider

Allied Aviation Corporation of Baltimore, Md., which is producing molded plywood LRA-1 gliders for the Navy, announced the Army Air Forces will use one of the Navy-type amphibian gliders for experimental tests.

Big Hangar for Goodyear

A new $2,300,000 flight hangar for testing wings and engines of Goodyear "Corsairs" is now under construction at the Goodyear Aircraft Corporation in Akron. The hangar, financed by the Defense Plant Corporation, is scheduled for completion around December 15. Designed by Goodyear and J. Gordon Turnbull, Inc., the hangar will be constructed entirely without interior supports, a large single span supporting the roof. The building will be equipped with three five-ton travelling cranes and four twenty-foot electrically-operated doors. An apron and runway of 100,000 cubic yards will be built leading to the Akron airport flight strips.

LAGG-3 Fighter Described

A description published in London of the Russian LAGG-3 fighter declares it is powered by a twelve-cylinder V-type engine of 1,100 h.p. and has a maximum speed of 350 m.p.h. at 16,400 feet. Constructed of wood and plastic, it carries one 20-mm. cannon and two one-half-inch machine guns, and is fitted with racks for six rocket bombs.

Muniz M-9, Brazilian Plane, Powered by Ranger Engine

Six-cylinder Ranger engines to be produced in Brazil by the government's engine factory will power the Brazilian Muniz M-9 patrol plane as well as Grumman Widgeon flying boats and Fairchild M-62 primary trainers being built in Brazil.

Headquarters Announces Publication of CAP Anthem, Composed by Two Members

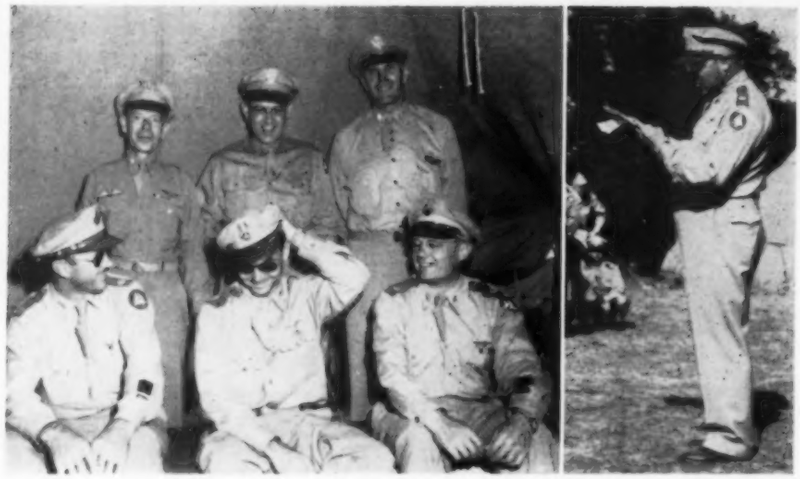
The official CAP anthem, entitled "Civil Air Patrol," composed by two CAP members, the music by Lowell Riley and lyrics by Jack Price, has been selected from many original compositions entered in the anthem contest several months ago. The song was selected for its marching rhythm and simplicity by a group of CAP National Headquarters officers, with the assistance of musical experts. The sheet music is now being printed by Allied Music Corporation, and orders may be placed through local music dealers at 35c a copy. No direct orders are taken. Royalties go to the AAF Welfare Fund, and a portion of the publishers' proceeds also go to this fund.

Fouling Avoided by Use of "Shroud Line" in Dropping Supplies from Airplanes

The Saginaw, Michigan, Civil Air Patrol Squadron has developed a technique for dropping leaflets and supplies without danger of fouling the rudder or elevator, or allowing the sheets to collect on guy wires and cause drag or change flying characteristics. A light string ties 1,000 or so sheets together, with a heavier cord looped through, so the package will fall well below the plane. Then the heavy cord is jerked, breaking the string, and releasing the pamphlets clear of the ship. In preparing the bundle, the heavy cord is looped and stuck down with gummed paper tape so it will not snarl. The cord is tied inside the plane, rather than held in the hands, to avoid burning or cutting fingers when the bundle is dropped. This squadron adopted a similar technique for dropping paper parachutes, which if rolled sometimes fail to open. The chutes are folded instead of rolled and fastened at the top with gummed paper through which a cord is passed. When the chutes are dropped, the cord tears off the seal.

Wisconsin Units Go In For Mobile Equipment

A rolling wing headquarters for the Wisconsin CAP is a de luxe trailer with berths, kitchen and office facilities. The Waukesha squadron, Wisconsin, has a field lighting unit built on a small trailer, with swivels for spotlights and seats for a crew of four. Under the seats are sixty kerosene flares. The trailer carries twelve red lanterns to mark obstructions and a motor-generator to charge the storage battery. Another Wisconsin squadron, Appleton, cut down a Model-A Ford and made a four-wheel trailer of it, with a 6,000-watt generator to run two flood-lights.



—Photos by Capt. D. L. Johnson.

NOTABLES AT TEXAS WING BIVOUAC in Kerrville hill country last month, directed by Wing Commander D. Harold Byrd of Dallas (right), included these happy officers. Front row, left to right, are Major J. W. McLendon, a Gulf Coast base commander; Capt. Zack Moseley, special service office on the national staff and creator of the popular "Smilin' Jack" comic strip and Major Richard P. Robbins, Florida Wing Commander. Standing, left to right, are Major G. H. Wenn, director of the AAF Ground School at Brooks Field, Texas; Major George A. Stone, Ohio Wing Commander, and Lt. Col. Earle L. Johnson, AC, National Commander of CAP.

Three-Day Texas Bivouac Attended by 750 CAP'ers and Visiting Notables

The Texas Wing of Civil Air Patrol held a three-day bivouac and maneuvers at Kerrville, Texas, during September, highlighted by a review and inspection of 750 CAP members and cadets before Col. Earle L. Johnson, National Commander. During the maneuvers, Army pilots in PT-19 planes from the Uvalde, Texas, Army Air Base put on acrobatic performances, and CAP members demonstrated bombing, parachute dropping, message pick-up and formation flying.

Major D. Harold Byrd, Texas Wing Commander, who was in charge of the maneuvers, introduced the speakers following the review and gave a short address on the new world geography being made by air travel. Col. Johnson in his address stressed the important role of the CAP in the war program and praised CAP for its aid in enlisting Army cadets and the training given them.

During the entire maneuvers, 134 privately-owned airplanes were at the field, while approximately 150 planes flew in and out, without an accident of any kind occurring during the maneuvers or in flight to and from Kerrville.

The Eighth Service Command of the Army co-operated in staging the maneuvers and sent 400 pup tents, 2,000 blankets, forty-eight Army vehicles, field kitchens and a mess sergeant. Over 7,000 meals were served with Judge Marion S. Church, Wing Intelligence Officer, as chief cook. Captain Bob Kenty, Wing Supply Officer, established and ran a canteen, while Capt. Gordon Maddox, Wing Medical Officer, maintained a complete base hospital.

Among other CAP and Army officers attending the maneuvers and bivouac were Major George W. Winn, Director of AAF Ground School, Brooks Field; Major George Stone, Ohio Wing Commander; Captain Charles Melton, Quartermaster Division, Fort Sam Houston; Major Richard P. Robbins, Florida Wing Commander, and Capt. Zack T. Mosley, special service officer, National Headquarters, and creator of "Smilin' Jack." Major Byrd and the Texas Wing were commended for the cleanliness, orderliness and military atmosphere of the maneuvers.

Free Ride Proves Useful in Recruiting Air Cadets

A New England regional plan for all six Civil Air Patrol Wings has been developed for recruiting Army cadets. CAP planes are assembled and exhibited in city after city with advance publicity. In Massachusetts, coupons are placed in the papers, and eligible boys bring these to the field for a drawing. The winners get a fifteen-minute free airplane ride, which usually is sufficient to sell them on the advantages of being a pilot in the Army.

Oklahoma Wing Signs 256 Cadet Aspirants, 326 CAPers in Statewide "Open House"

The Oklahoma Civil Air Patrol has held a statewide celebration at twenty-six airports, attended by more than 150,000 persons. At the twenty-six participating airports there were displays of aircraft and demonstrations by CAP members. As a result of the "open houses," 256 prospective aviation cadets were presented to the Army Air Forces, and 326 persons were enlisted in the Civil Air Patrol, Major Moss Patterson, Oklahoma Wing Commander, announced. The idea of the statewide solicitation was suggested by Captain Keith Kahle, CAP, state executive officer, who also handled arrangements for the event.

Mississippi Wing Plans Mobilization Soon

A statewide meeting and inspection of the Mississippi Civil Air Patrol will be held in the fall, Wing Commander Major J. Robert Dowd, of Jackson, Miss., announced recently. Lt. Col. Earle L. Johnson, national commander, and others from national headquarters' staff have been invited to attend the meeting.

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Bendix Hydraulics Specified

Bendix Aviation, Ltd., recently announced eleven of the twelve aircraft hydraulic products they manufacture have been declared standard Army-Navy equipment, and official action on the twelfth is pending. The firm is furnishing twenty-one of twenty-two major U. S. aircraft companies with equipment for use on fifty-nine types of planes. Bendix developed plastic poppets for valves, which have proved successful due to sealing qualities under high pressure. The eleven products declared standard are: hand pump, five, seven and one-half-inch accumulators; pressure regulator, one-quarter, three-eighths, one-half and three-quarter-inch check valves; three one-half GPM (three-eighths inch), six GPM (one-half-inch) and sixteen GPM (three-quarter-inch) four-way valves.

More Nylon Tires

The nylon cord tire program, which has been proceeding on a small scale, is being materially enlarged to meet the Army Air Forces' need for stronger tires for bombers, fighters and transports. Quantity shipments of high strength nylon yarn have gone from the Du Pont Company's plant to six tire and rubber companies, and shipments are to increase until the total by the end of the year reaches three quarters of a million pounds of yarn.

Films Aid Tool Care

Six educational talking pictures on the "Use and Care of Hand Tools," prepared under U. S. Army Ordnance supervision by the Plomb Tool Company, Los Angeles, for the instruction of students and mechanics, are available to industry and vocational schools at cost, the Plomb Company recently announced. Made on 16mm film, with sound, the pictures may be obtained as a group or singly. They cover various types of hand tools in general use, and show correct methods for faster and safer work, together with abuses to be avoided.

Availability of Aircraft Repair Parts in Oklahoma

BARTHOLOMEW

Supply Division, Inc., in Oklahoma City, Okla., has sizeable stocks of Franklin, Lycoming and Continental engine parts, according to Fred M. Bartholomew, manager. He said Continental and Lycoming bearings and crankshafts are still critical, but quantity supplies are expected during October. Such items as dopes, fabrics, pinked and ribbed tapes, thinner, propellers, brass safety wire, control cable, Cub and Taylorcraft shock rings, tires and tubes are on hand for immediate shipment. Bartholomew said materials for aircraft repair can be shipped on AA-2 priority, with the exception of AN specification bolts, tailwheel assemblies and replacement parts, shielded ignition cable and safety wire. Mimeographed instructions for ordering supplies with priority are available on request.

Enlist CIVIL AIR PATROL *in your*

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933, of SOUTHERN FLIGHT, published monthly at Dallas, Texas, for October, 1943.

State of Texas,
County of Dallas,
ss

Before me, a Notary Public in and for the State and county aforesaid, personally appeared R. T. Gidley, who having been duly sworn according to law, deposes and says that he is the Business Manager of SOUTHERN FLIGHT, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher: Air Review Publishing Corporation, Dallas, Texas.
Editor: George E. Haddaway, Dallas, Texas.
Business Manager: R. T. Gidley, Dallas, Texas.

2. That the owner is: (if owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Air Review Publishing Corporation, 1901 McKinney Ave., Dallas, Texas.
Stockholders:
George E. Haddaway, R. T. Gidley, D. H. Byrd, Martha Byrd, Thomas Ashley, Jr., Antoinette Hagmann, Dallas, Texas; W. G. Green, Tulsa, Oklahoma; John W. Herbert, D. L. Johnson, R. Haddaway, Fort Worth, Texas.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages, or other securities are: NONE.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is: (This information is required from daily publications only.)

(Signed) R. T. GIDLEY,
Business Manager.

Sworn to and subscribed before me this 16th day of September, 1943.
(Signed) JOYCE KINCAID.

My commission expires June, 1945.

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NEW LITERATURE

(Continued from page 66)

Young Radiator Company, *Racine, Wisconsin,* has announced the new Young Catalog No. 143 summarizing their heat transfer equipment for every application, including supercharger intercoolers, cabin heating coils, oil temperature regulators and engine jacket coolant radiators.

Elmer E. Mills Corporation, *812 West Van Buren St., Chicago,* is now offering Catalog III on "Injection Molded and Extruded Plastics. This forty-page book, of which sixteen pages are four-color reproductions of Mills' products, is a revise of former editions. It includes several pages of information about Miss-Plastic tubing and fittings. For a copy write on your letterhead to Dept. F.

New "Priorities" Bulletin

A new publication, "Products and Priorities," containing information on all products, materials and service handled by the War Production Board, will be issued by the WPB every four weeks, beginning in October. The publication combines information formerly contained in "Priorities" and in "Product Assignments," both of which will be discontinued. A year's subscription of thirteen issues may be obtained for $2.00 from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. Single issues are available at 20 cents each. Subscribers to "Priorities" will receive the new publication for the balance of their subscriptions.

Taylorcraft Promotes Robert H. Wendt and K. W. Tibbits

The Taylorcraft Aviation Corporation has announced promotion to vice presidencies of Robert H. Wendt, Chief Engineer, and Kenneth W. Tibbits, Production Manager. Wendt will have charge of all engineering, research and experimental activities of the company, and Tibbits will supervise all manufacturing, including Taylorcraft Army planes and subcontract work for other aviation companies. The company is engaged in the production of Army L-2 liaison-observation "grasshopper" planes, an adaptation of its commercial tandem trainer used in Civilian Pilot Training Programs.

Indoor "Airport" Tests New Landing Gear Equipment

An "indoor airport" for testing landing gear equipment for impacts up to 400,000 pounds is now operating at the Bendix Aviation Corporation plant at South Bend, Indiana. The "inside landing field" is a three-story building housing a trip hammer forty-five feet high, which drops with landing strut attached, simulating landing impacts of planes up to twice the tonnage of present heavy bombers. Special instruments and gauges record the effects of impacts upon actual aircraft shock-absorbing landing gear struts.

New Cold Test for Synthetic Rubber Material

Synthetic rubber made by the Hycar Chemical Co., Akron, Ohio, is being tested in experimental laboratories for use in sub-zero altitudes where mercury drops as low as sixty-five degrees. Samples of the rubber-like product are placed in specially designed refrigerators in which the materials can undergo test more severe than the finished product would encounter under actual use.

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From Dallas town and Mustang Airport, where Herbie Nash holds things down or gets 'em up as the case might be, we flew over to Cowtown, which is the friendly way to say Fort Worth. We were with Lt. John "Toad" Fitch in Major Byrd's sassy little Stinson, and . . .

"Over to Cowtown" saw Virginia and Reed Pigman, Wm. McDonald, while gulping the two-bit special which is now 60 cents War Money, and saw Tommie Thomas (Birmingham) in the Aircredit office, and heard from Gene Royer that they will finance your jeep too, so you can go out to the airport in style . . . then we went over to Les Bowman's place of business and got a special trip through the engine and airplane repair shop . . . what a deal . . . he can really turn out the work and is catering to little guys with small aircraft. His head-up man is Jim Wall, and ole Jim has plenty of factory training in his back log.

Ted Royce flew us over to Singleton Airport, which is now a Navy training station (Les Bowman's), in charge of Mrs. "Muggs" Beach. Muggs is fresh from California, working to get her instructor's rating . . . real pretty, too . . . Representing the Navy is one Lt. (jg) Richard Bruce, who sees to it that "all is well" . . . Boyd Kennedy is the Chief Pilot . . . wouldn't mind joining the WAVES if we could get our flyin' learnin' here . . .

Comings and Goings in Dallas—Ted Crimson, Bill Slade, Ted Wood, all from the Consolidated Plant in Tucson, Arizona . . . Ed Doak, Red Rosier, Joe Moore, from Doak Aircraft in California; Bert Monesmith, George Fisher, Jack Bonser, top flight Douglas men, also from the orange pickin' state . . . also an armload of celebrities to help sell some bonds . . . like Jack Holt, Tyrone Power, Robert Taylor, Jack Dempsey, Maxie Baer, Barbara Stanwick (who is the only one not in uniform).

Bob Iliff . . . Lockheed Lothario . . . is courtin' the Navy with intent . . . which will cause the "cookie department" to weep big tears, 'cause he's a cinch to make it . . .

Reagan Stunkel flew in . . . welcomed by Don Marshall . . . no connection between that and the QB meetings now held at the Melrose . . . Charlie Short attended the last one, so did Bill Green, Jack Story, Allen Guiberson, Pete Cavender and a gillion others . . . It *was* quiet, too . . .

Marion Melcher reports from Kansas City, Missouri—We've ended the airport view ban and spectators are now permitted on the observation deck of the terminal building at the Municipal Air Terminal. Cameras, of course, are out for the duration . . The Army-Navy "E" award was presented to the builders of the Pratt & Whitney engine plant on September 24. The Long Construction Company of Kansas City and the Turner Construction Company of New York were given credit. Presentation was made by Rear Admiral Henry G. Taylor of Chicago. Incidentally, your reporter was conducted through the plant for four hours one day this month—and in a little blue wagon that scooted about ten miles per.

J. H. Kindelberger, president of North American Aviation, spoke before a special meeting of the Aviation committee of the Chamber of Commerce in August, revealing that the plant in the Fairfax district will have produced by the end of this year more medium bombers than any other plant in the world.

The pilots of the 2nd Ferrying Squadron are at ease now, thanks to the Kansas City Unit of the WNAA having furnished their Ready Room. A barren room when they took over the project one month before, on the evening of Open House—September 17—Lt. Col. Wm. J. Fry, commanding officer of the base, commented: "Wonderfully done!" The Unit, consisting of 107 members, was the only thing feminine about the finished product—for the Ready Room looks comfortable, lounge-like and sends its ferry pilots off with a pleasant remembrance of Kansas City. Among its outstanding events of the month, the Unit had as its guest speaker Capt. Otis F. Bryan, who was the pilot of President Roosevelt on several legs of the Casablanca journey.

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